March 1983

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Issue No 12

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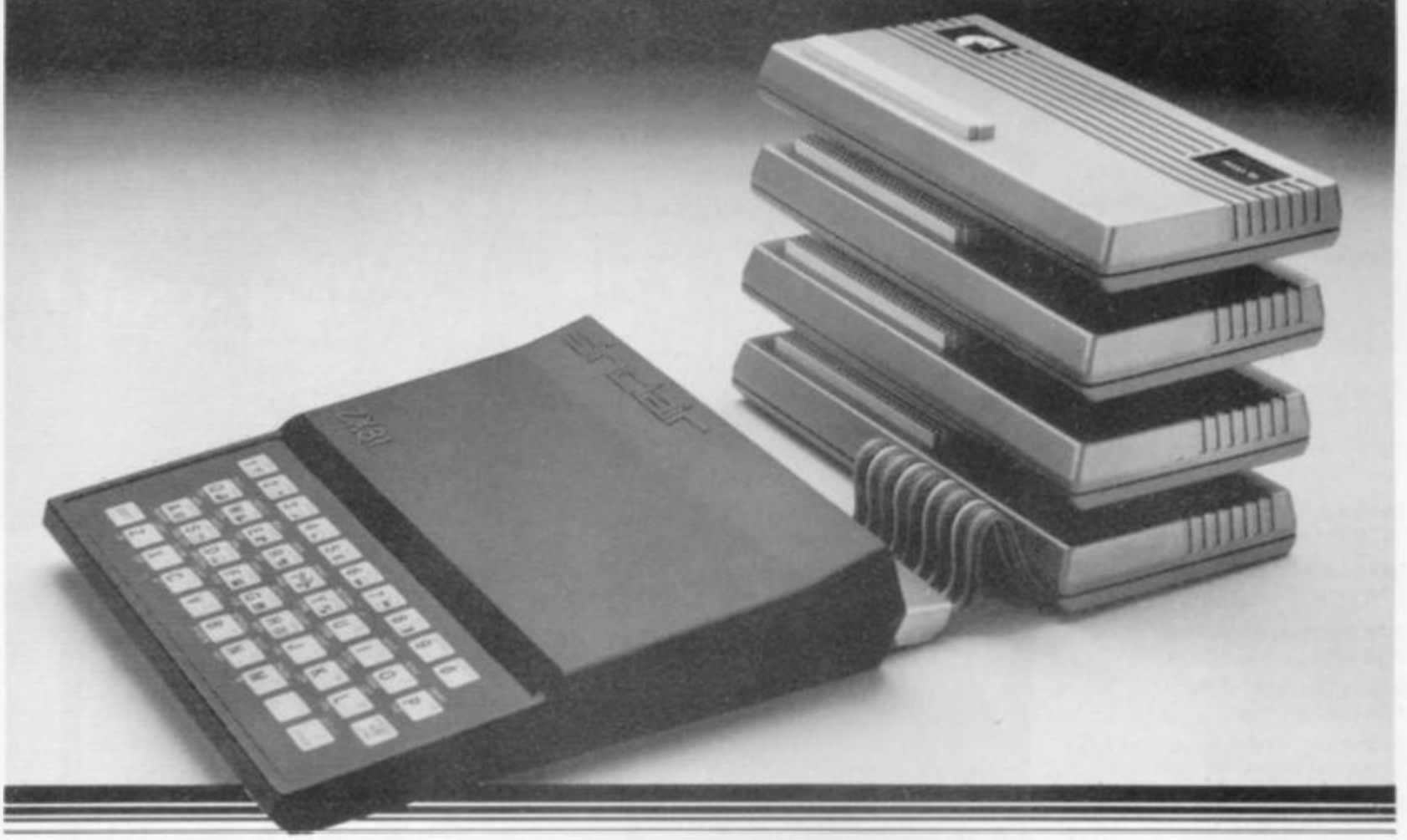
NEXT MONTH

We begin a new series, Sinclair user of the month, with articles on people nominated by readers, and Stephen Adams reviews the Memic memory unit from Camel.

HOW TO GROW UP TO A REAL COMPUTER



If you're enthusiastic about microcomputing, sooner or later you'll ask yourself the question . . . "where do I go from here?"

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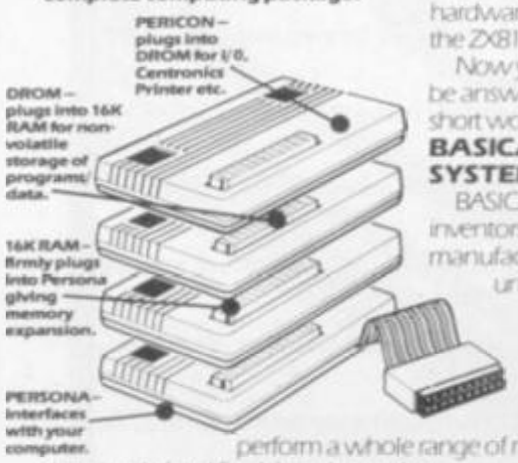
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BASICARE MICRO SYSTEM

Spectrum price speculation

IN A HECTIC START to the year it is difficult to pinpoint the items which eventually will be seen to have been of the most significance. Troubles at Timex in Dundee led to rumours of Sinclair production going overseas. A successful share sale made Clive Sinclair a very rich man and has shown there is plenty of capital available for any future expansion plans.

Timex in the U.S. announced the launch of an updated Spectrum for the American market at prices substantially lower than those in Britain. The event which could have the most immediate impact is the launch of the TS2000. Although it will not go on sale until May or June, it has already given rise to speculation that prices could soon be reduced in Britain.

At $149.95 for the 16K and $199.95 for the 48K, that translates into about £95 and £125. If they can be made profitably for those prices in the States there is no reason to suppose that similar prices cannot be charged here.

Apart from it being possible, it also makes commercial sense to do it sooner rather than later. A number of machines are coming to the market which could be said to be competitors, notably the Oric.

A fall in Sinclair price in the next few months, coupled with the existing hardware and software support, would

be sufficient to raise demand considerably, confirming the company's position as market leader.

It should be added, however, that it will be competitive pressures alone which will decide the future pricing system for the Spectrum. The company showed that was so with the ZX-81 and it will be no use hoping that the TS2000 will pose a threat to sales in Britain. The Timex machine has been made compatible with the U.S. television system and will not work here.

None of those moves is likely to worry the small group of financial institutions which paid £13.6 million for a 10 percent stake in Sinclair Research. Seen from a number viewpoints, the success of the share sale is amazing.

Only three years ago the company was reporting profit of £34,000 on sales of £257,000. By 1981 those figures had soared to profit of almost £9 million on sales of £27.6 million. Profit for last year is being estimated at £14 million.

The success is spectacular but anything which rises so quickly can just as easily fall away again. In addition, the Sinclair policy of subcontracting everything it can do means that the asset base is very small. Four research centres and offices in London are the total physical assets.

A collection of insurance companies and pension funds are backing the human assets of the company. The one major asset is Clive Sinclair, supported by all those around him who translate his ideas to form saleable items on the shop shelves.

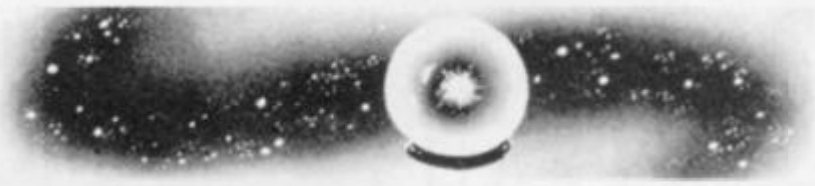
As we hope we have shown in our Inside Sinclair series of articles, Sinclair Research is much more than a one-person company. It cannot be denied, however, that Clive is the man with the ideas and it has been his special brand of ideas which has been the hallmark of the success of his company.

Should his ideas for computers evaporate or his attention be diverted to other projects, like the electric car for example, the company lead in microcomputing would be in difficulty. One of the interesting comments

made by Jim Westwood in his interview last year was that he still flinches at some of the ideas Clive has had. It needs only two high-cost failures and Sinclair Research would be back where it started.

As is being shown by the present problems at Timex in Dundee, Sinclair is also vulnerable to circumstances outside its control. Although none of the 700 workers on the ZX-81 and Spectrum production lines are affected directly by the redundancies in the watch-making factories, they are involved in the fight against the plans of Timex for reduction of the workforce.

Sinclair Research has said that it has contingency plans so that output will not be affected if a strike starts



and production is moved. The changes, however, could not be without short-term disadvantages.

All this speculation about the future of Sinclair Research assumes that the people behind it see it as a leading British maker of microcomputers with a few other research ideas as a sideline.

It could be that the company was called Sinclair Research because that is what it was intended to be — a pure research company which then licensed others to do the day-to-day production of whatever it evolved.

If that is the case, the company future depends just as much on the success of the flat-screen television and the electric car as on developing a new computer. This year is likely to provide a better idea of the truth of that notion.

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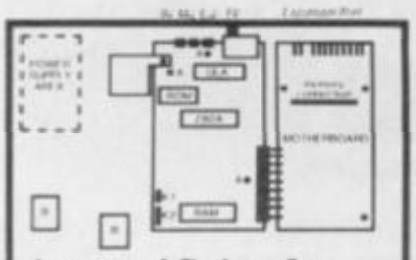
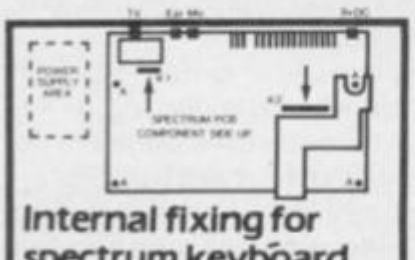


Internal fixing for ZX 81 keyboard case.



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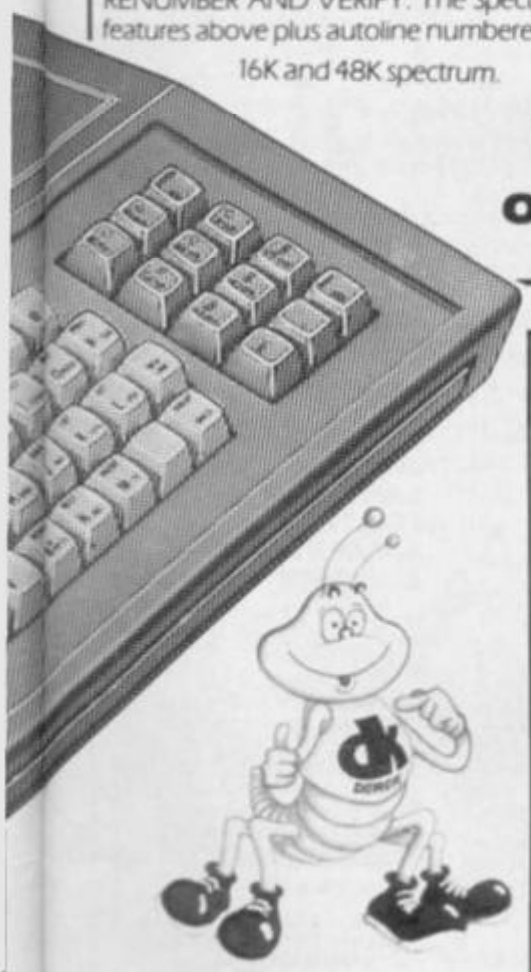

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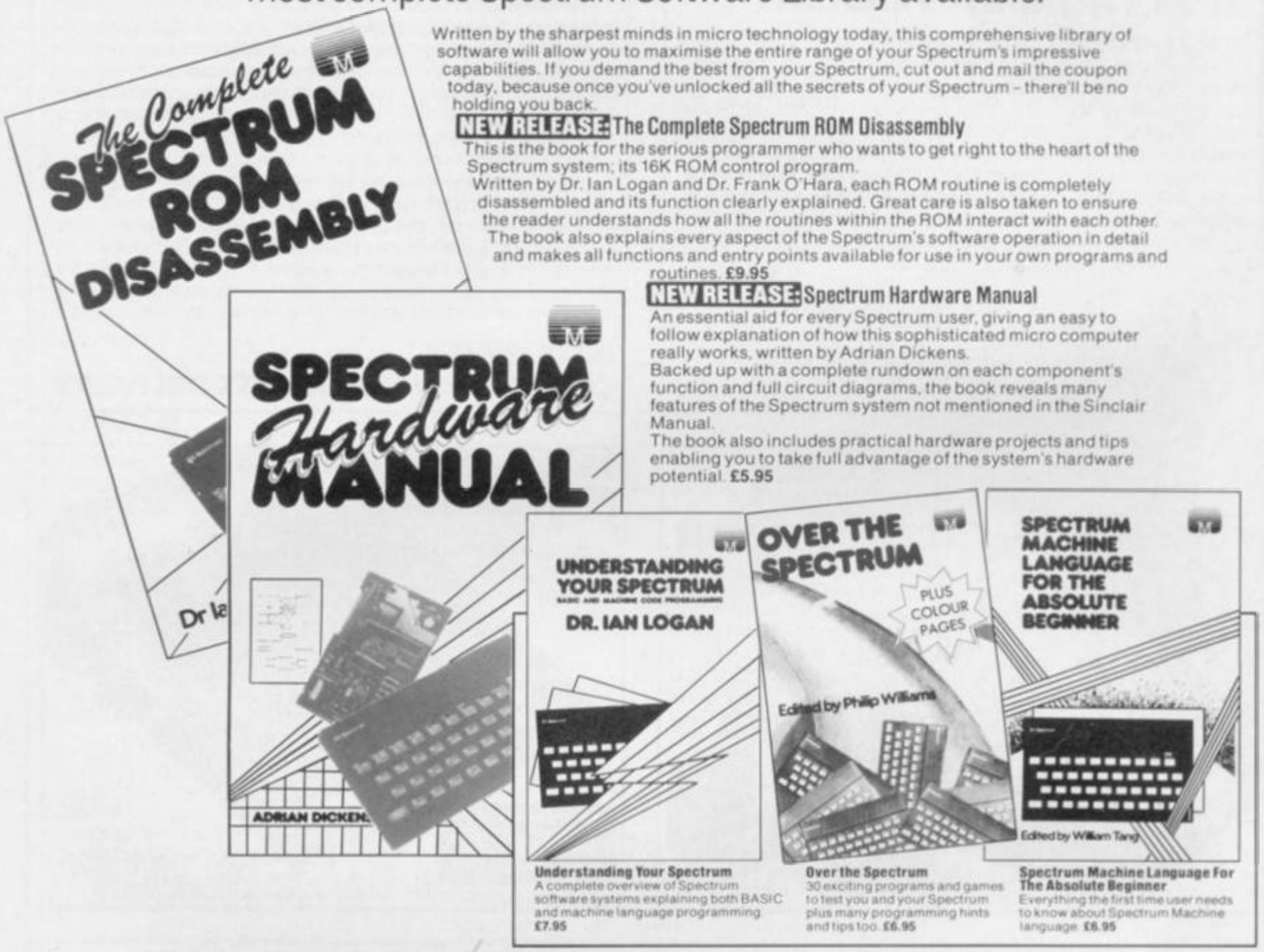

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Britain

Aylesbury ZX Computer Club: Ken Knight, 22 Mount Street Aylesbury (5181 or 630867). Meetings: first Wednesday and third Thursday of the month.

Doncaster and District Micro Club: John Woods, 60 Dundas Road, Wheatley, Doncaster DN2 4DR; (0302) 29357.

Eastwood Town Microcomputer Club: E N Ryan, 15 Queens Square, Eastwood, Nottingham, NG16 3BJ.

Edinburgh ZX Users' Club: J Palmer (031 661 3183) or K Mitchell (031 334 8483). Meetings: second Wednesday of the month at Claremont Hotel.

EZUG-Educational ZX-80/81 Users' Group: Eric Deeson, Highgate School, Birmingham B12 9DS.

Furness Computer Club: R J C Wade, 67 Sands Road, Ulverston, Cumbria (Ulverton 55068). Meets every other week on Wednesday evenings.

Glasgow ZX-80/81 Users' Club: Ian Watt, 107 Greenwood Road, Clarkston, Glasgow G76 7LW (041 638 1241). Meetings: second and fourth monday of each month.

Hassocks ZX Micro User Club, Sussex: Paul King (Hassocks 4530).

Inverclyde ZX-81 Users' Club: Robert Watt, 9 St. John's Road, Gourock, Renfrewshire, PA19 1PL (Gourock 39967). Meetings: Every other week on Monday at Greenock Society of the Deaf, Kelly Street, Greenock.

Keighley Computer Club: Colin Price, Redholt, Ingrow, Keighley (603133).

Lambeth Computer Club: Robert Barker, 54 Brixton Road, London, SW9 6BS.

Merseyside Co-op ZX Users' Group: Keith Driscoll, 53 Melville Road, Bootle, Merseyside L20 6NE; 051-922 3163.

Micro Users' Group: 316 Kingston Road, Ewell, Epsom, Surrey, KT19 0SY.

National ZX-80 and ZX81 Users' Club: 44-46 Earls Court Road, London W8 6EJ.

Newcastle (Staffs) Computer Club: Meetings at Newcastle Youth and Adult Centre, Thursday, 7.30 to 10.00pm. Further information from R G Martin (0782 626065).

North Hertfordshire Home Computer Club: R Crutchfield, 2 Durham Road, Stevenage; Meetings: first Friday of the month at the Settlement, Nevells Road, Letchworth.

North London Hobby Computer Club: ZX users' group meets at North London Polytechnic, Holloway Road, London N7 each Monday, 6pm.

Nottingham Microcomputer Club: ZX-80/81 users' group, G E Basford, 9 Holme Close, The Pastures, Woodborough, Nottingham.

Orpington Computer Club: Roger Pyatt, 23 Arundel Drive, Orpington, Kent, (Orpington 20281).

Perth and District Amateur Computer Society: Alastair MacPherson, 154 Oakbank Road, Perth PH1 1HA (29633). Meetings: third Tuesday of each month at Hunters Lodge Motel, Bankfoot.

Regis Amateur Microcomputer Society: R H Wallis, 22 Mallard Crescent, Pagham, Bognor Regis, West Sussex, PO21 4UU.

Scunthorpe ZX Club: C P Hazelton, 26 Rilestone Place, Bottesford, Scunthorpe; (0724 63466).

Sheffield ZX Users' Club: A W Moore, 1 Ketton Avenue, Sheffield, S8 8PA, Yorkshire. Annual subscription £10, monthly newsletter and cassette.

Sittingbourne: Anurag Vidyarthi (0795 73149). Would be interested to hear from anyone who wants to start a club near the Medway towns.

Stratford-on-Avon ZX Users' Group: Chris Parry, 16 Sackville Close, Stratford-on-Avon, Warwickshire.

Swansea Computer Club: B J Candy, Jr Gorlau, Killay, Swansea (203811).

Swindon ZX Computer Club: Andrew Bartlett, 47 Grosvenor Road, Swindon, Wilts SN1 4LT; (0793) 3077. Monthly meetings and software library.

Worle Computer Club: S W Rabone, 18 Castle Road, Worle, Weston-super-Mare BS22 9JW (Weston-super-Mare 513068). Meetings: Woodsprings Inn, Worle, on alternate Mondays.

ZX-Aid: Conrad Roe, 25 Cherry Tree Avenue, Walsall WS5 4LH (Walsall 25465). Please include sae. Meetings twice monthly.

ZX Guaranteed: G A Bobker, 29 Chadderton Drive, Unsworth, Bury, Lancashire. Exchanges information and programs throughout the country.

ZX-80/ZX81 Users' Club: PO Box 159, Kingston-on-Thames. A postal club.

Overseas

Belgian National Sinclair Users' Club: P Glensson, Rue Abbe De l' Epeestraat, 14, 1200, Brussels.

Belgium, France, Luxembourg: Club Sinclair, Raymond Betz, 38 Chemin du Moulin 38, B-1328 Ohain, Belgium (322 6537468)

Belgium, Netherlands: Microcomputer Vereniging BZW, Paul Glenisson, Priester de l'Epéestraat 14, B-1200 Brussels, Belgium (322 7349954)

Denmark: Danmarks National ZX-80/81 Klub (DNZK), Jens Larson, Skovmosevej 6.4200 Slagelese, post giro 1 46 24 66.
ZX-Brugergruppen i Danmark, Boks 44, 2650 Hvidovre. Gratis medlemskab og gratis blad til enhver interesseret.

East Netherlands: Jonathon Meyer, Van Spaen Straat 22,6524 H.N. Nijmegen; (080 223411).

Germany: ZX-80 Club, a postal club; contact Thomas Jenczyk. Hameln, Postfach 65 D-3250 Hameln, Germany.

Indonesia: Jakarta ZX-80/81 Users' Club, J S Wijaya, Jakarta, Indonesia.

Irish Amateur Computer Club: Martin Stapleton, 48 Seacourt, Clontarf, Dublin 3. (331304).

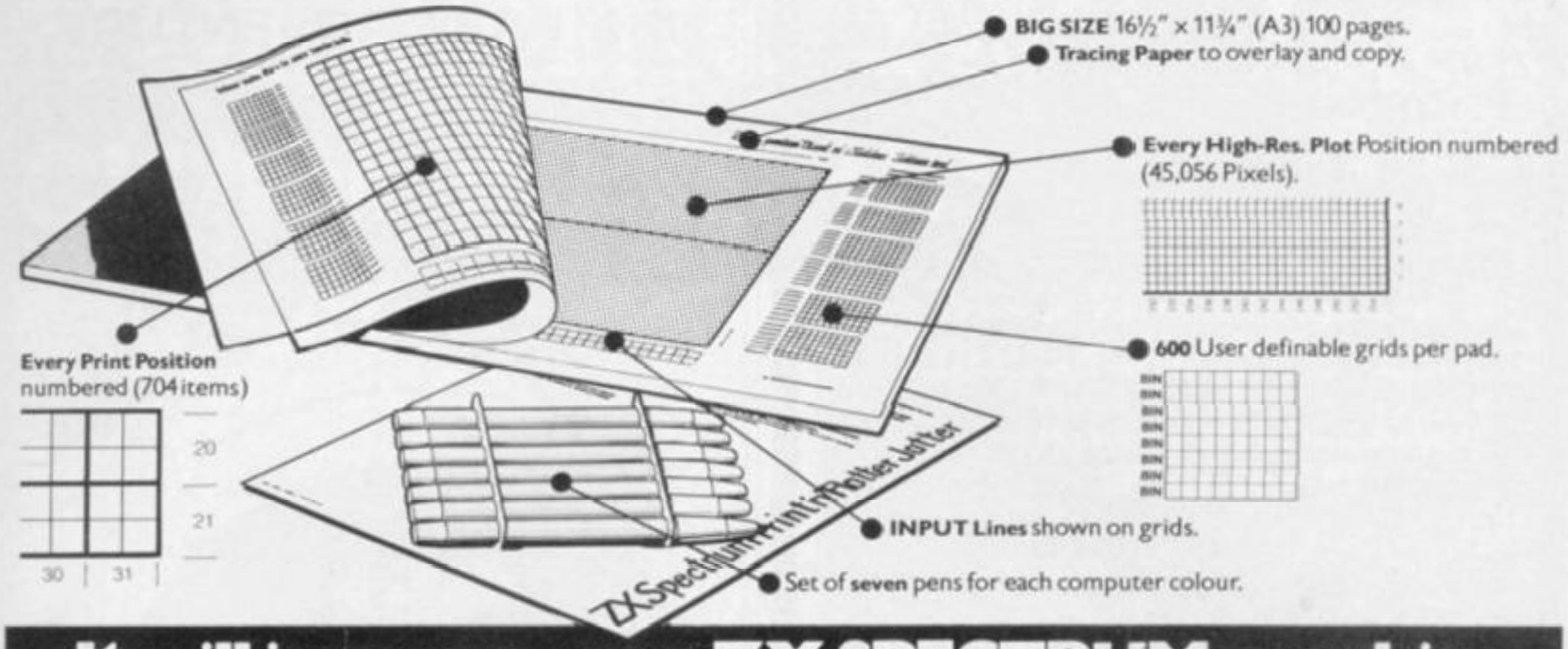
Republic of Ireland: Irish ZX-80/81 Users' Club, 73 Cnoc Crionain, Baile Atha, Cliath 1.

Singapore: Sinclair Users' Group: Eric Mortimer, 1D Wilmer Court, Leonie Hill Road, Singapore.

South Africa: Johannesburg ZX80/81 Computer Users' Club: S Lucas, c/o Hoechst SA (Pty) Ltd, PO Box 8692, Johannesburg. Teaches Basic and machine code, interest in hardware.
Johannesburg ZX Users' Club: Lënnërt ER Fisher, PO Box 61446, Marshallstown, Johannesburg.

Spain: Club Nacional de Usuarios del ZX-81, Joseph-Oriol Tomas, Avda. de Madrid, No 203 207, 10, 3a esc. A Barcelona-14 Espana. International ZX Spectrum Club: Gabriel Indalecio Cano, Sardana, 4 atrico 2a, San Andres de la Barca, Barcelona. Send international reply coupon. Produces a bi-monthly magazine. Spanish ZX Micro Club: Apartado 181, Alicante (Costa Blanca), Spain.

United States: Bay Area ZX-80 User Group, 2660 Las Aromas, Oakland CA94611. — Harvard Group, Bolton Road, Harvard MA 01451; (617 456 3967).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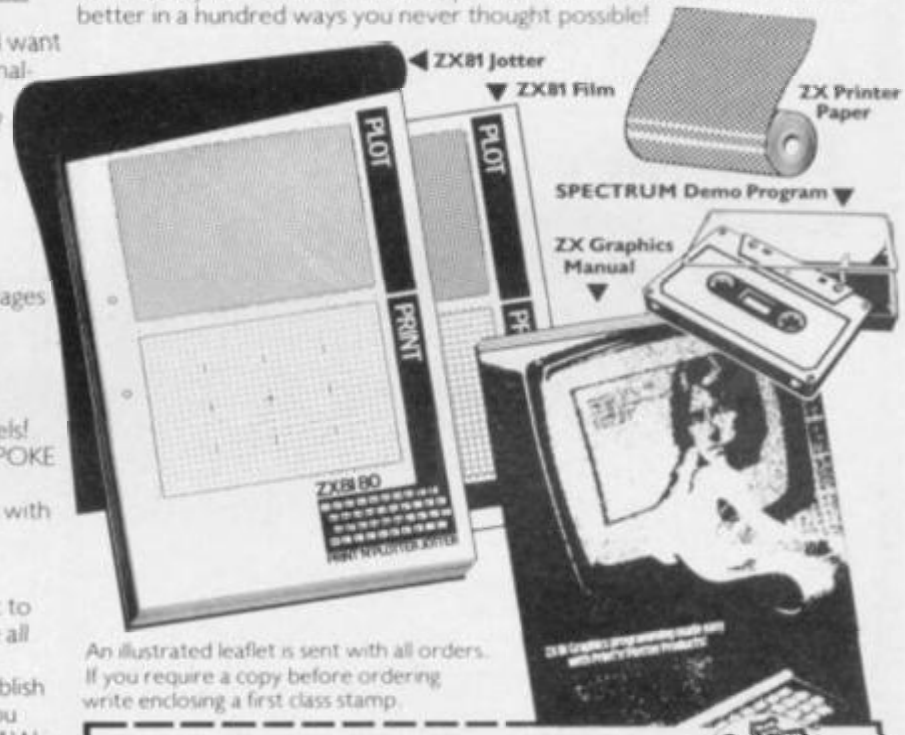

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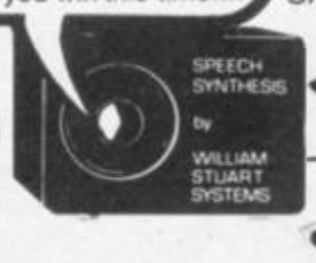

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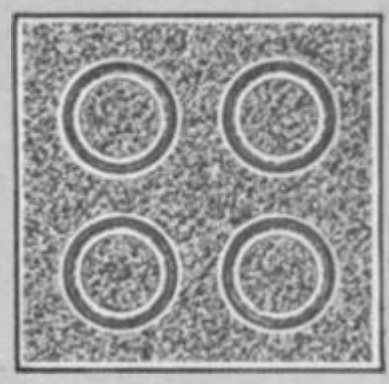

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Peace is sought at Timex

THE likelihood of a strike about redundancies at the Timex factory in Dundee was receding as we went to press. A growing number of workers have said they are willing to take voluntary redundancy and early retirement to cut the workforce.

The company is seeking to reduce the workforce to about half its present size because of a fall in the demand for watches and the loss of the Nismlo contract. Sinclair production is not directly affected.

If a strike is called, Sinclair Research has said that it will switch production to a number of other plants. A spokesman for the company emphasised that was not an idle threat and that it had plans for moving production at a moment's notice.

He added that he could not say where the plants were, as they might never be needed, but added that a number of companies with spare capacity had the necessary expertise to allow them to make the Sinclair machines.

The rumour that production may be moved to the French plant of an associate company of Timex was denied firmly.

For some time Thorn-EMI at Feltham, Middlesex, has been producing Spectrums but the wider range of alternative sources was not set up until the strike at Dundee in November.

Clive now worth more than £120 million

CLIVE SINCLAIR is now officially worth more than £120 million. The private placing of shares, announced at the launch of the Spectrum, has now been settled with a value of £136 million being put on Sinclair Research, of which his personal share is about 85 percent.

A number of unnamed financial institutions, believed to be about 30, have agreed to buy 400,000 shares at £34 each, which is a total of £13.6 million for 10 percent of the company. The sale was heavily oversubscribed.

The latest figures available show that in the year to March, 1982 Sinclair Research made a profit of almost £10 million on sales of £27.6 million. It is expected that profit for the year to March this year will rise to £14 million.

It is believed the company would like a full stock market listing within the next year.

Most of the money raised will be used to finance work on the Sinclair electric car. The extra cash is needed to ensure that resources do not have to be diverted from computers.

ZX word processor

SINCLAIR RESEARCH is aiming to prove that the 48K Spectrum can be used as a serious business machine. The company is developing a software package which will transform the Spectrum into what it hopes will be a powerful word processor.

The word processor will be capable of driving a dot matrix printer. To do that it will have to be connected to the Sinclair RS232 serial interface which is to be launched later this year.

The program allows text to be typed-in from the keyboard and then edited by moving the cursor around the screen. The finished text can then be output to large printers or the Sinclair thermal printer.

The display created by the word processing program will be 62 characters in one line and, through proportional spacing, text can be justified down the left- and right-hand sides of the screen.

Shows are still popular

THE FIRST major Sinclair show of the year is being held on Saturday, February 26. The ZX Microfair is at the usual venue, the New Horticultural Hall, Westminster, SW1, between 10am and 6pm.

The organiser, Mike Johnston, says that the last show, held in December, drew around 7,000 people and was the best ever from the point of view of exhibitors.

The second Northern Computer Fair is to be held on March 12 at Pudsey Civic Centre, Dansons Corner, Stanningly — it lies between Leeds and Bradford. Northern Premier Exhibitions says the show is generating a good deal of interest.

On March 19 the Bristol Hobbyist Microfair will be held by British Telecoms Computer Club. The show will take place at Horfield Territorial Army Centre, Horfield Common, Bristol and will be open from 10.30am to 5.30pm.

The Association of London Computer Clubs is staging its annual show, the Fourth London Computer Fair, between April 13 and 16. The show will be held at Central Hall, Westminster, former venue for ZX Microfairs. It is co-sponsored by the GLC as part of the London Computer Festival.

Microscene Hallam '83 will be at the Top Rank Suite, Arundel Gate, Sheffield on Saturday, April 16. The doors should be open from 9.30am to 5.00pm.

The Scottish Personal Computer World Show is to be staged from April 16-18 at MacRoberts Pavilion, Ingleston, Edinburgh. It follows the successful London show which, the sponsors claim, attracted more than 47,000 people.

Happy festive sales season

A SPECTACULAR sales boom occurred among retailers and mail order wholesalers during the Christmas period.

Stewart Biddie, merchandise controller for W H Smith said: "Sales have been incredible since the price drop of the ZX-81 and we have had difficulty in keeping sufficient stocks. The sale of software for the ZX-81 at Christmas went very well and there is no need to say how the new Spectrum lines of software have been selling.

"The number of branches selling the Spectrum has incresed because of the demand and it is being sold at 200 branches, including the 65 where it was sold originally."

Bob Denton

Prism Microproducts, wholesale distributor of Sinclair machines and software and sister company of ECC Publications, also had a good Christmas.

Bob Denton, Prism managing director, said: "It was a computer Christmas and sales of hardware and software have gone well."

The major software houses also reported a boom in business. Douglas Berne of Silversoft said: "Things took off at the beginning of November and stayed the same well into January."

Richard Turner of Artic Computing told a similar story. "We had an incredible response and the big problem has been keeping up stocks. The demand is still heavy but we are almost back to normal."

More outlets

SPECTRUMS are now on general retail sale. From February 21, Prism Microproducts, a sister company to ECC Publications which publishes *Sinclair User*, has been handling the retail distribution of the latest Sinclair machine.

The move is part of a wide-ranging effort to make the full range of Sinclair products more available to the public.

Prism has appointed a procurement agency to deal with assessing software and hardware products in the market for general distribution. The company is also considering adopting a new system for selling on what is known as the rack-jobbing system.

The system is being tested in the London area in March and April and, if successful, will be extended to all of Britain. Bob Denton of Prism Microproducts says:
"This will provide a better service because users will see a broader selection".

Magazine for all ages

THE TYPICAL reader of *Sinclair User* is aged between 10 and 45, is likely to earn less than £10,000 and is almost certain to have one of the Sinclair computers. That is revealed in the survey we conducted in the autumn.

We had an excellent response, with more than 4,000 people replying.

The readership is fairly evenly spread across the ages up to 45, with 29 percent being under 16;21 percent between 16 and 25;20 percent between 26 and 35; and 16 percent between 36 and 45. Of those of employable age the vast majority had a job, with the highest percentage earning between £5,000 and £10,000.

Our survey revealed that 34 percent had had their machines for between one and six months. Almost 30 percent, however, had bought the machines between six months and a year ago. All those dates can be increased by at least three months since the survey. At the time only four percent of readers were waiting for delivery of an ordered machine.

Mail order was the most popular method of purchase by all age groups, apart from the those under 16, who preferred to go to W H Smith. The second-hand market was healthy, with seven percent of readers buying that way.

Council promotes computers

THE LONDON Borough of Camden is one of the first local authorities to launch into the microcomputer scene. A club for the owners of various microcomputers, including the ZX-81 and Spectrum, has been started at Queen's Crescent Library, Camden. Meetings are held every week on Tuesdays at 7.30 pm.

The library department of Camden expressed interest in promoting microcomputer literacy through computer clubs in its libraries and the council hopes that the club will be the first of many in the borough.

Will Jackson, one of the organisers, says: "I own a ZX-81 and now have a Spectrum. I saw a need for a club which could exploit British machines, like many of the courses in this country which use American machines such as the Pet or Vic-20.

"There are not sufficient books which explain computing in a way beginners can understand. I am no expert at computing but I know something about Basic and other areas of computing through a course I did several years ago."

According to Jackson, the club should be of interest to people of all ages and professions. The use of microcomputers for serious applications will also be explored, so the more advanced programmers will have something to do.

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WINGED AVENGER *"One of the best ... covers all the stages of the arcade original ... a game to come back to." Pop Comp Wkly.* Very fast 'PHOENIX' 7 play levels: 3 attack waves: laser shield: mothership with smart bombs. (Work force) £4.50 (16K ZX81 version, £4.50)

GROUND ATTACK *"Best Spectrum version of the arcade game" Yr Comp: "Very absorbing" E&C. "Extremely good" Pop Comp Wkly.* Thrilling SCRAMBLE. Pilot your ship thro' 26 zones: up, down, brake, thrust: smart bombs: as you get better, it gets harder. (Silversoft) £5.95

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ESCAPE *"One of the best and most original games we have seen" S User.* 5 very real dinosaurs chase you round the maze as you search for the axe to escape. Different maze every time. 5 play levels: 9 speeds: Hall of Fame. (New Generation) £4.95

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COSMOS NEW! Fantastic graphics. Loads in 2 parts (instruction manual first). Protect your 9 ships against 18 aliens, warp mines, asteroids. Your graphic on-board computer helps with elaborate displays. Our favourite new game. (Abbex) £4.95

FAUST'S FOLLY The first adventure we've seen that's worth playing in 16K. It's great and it's got graphics! Loads in two parts: clear instructions first. Then a smashing adventure with directions, inventory, look, score, save. Amazing! Abbex) £4.95

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CAVE-INS should you hit the side of the cave with your Lazer Cannon or Bomb, part of the roof will cave-in on you – the greater the landslides to avoid each time!.
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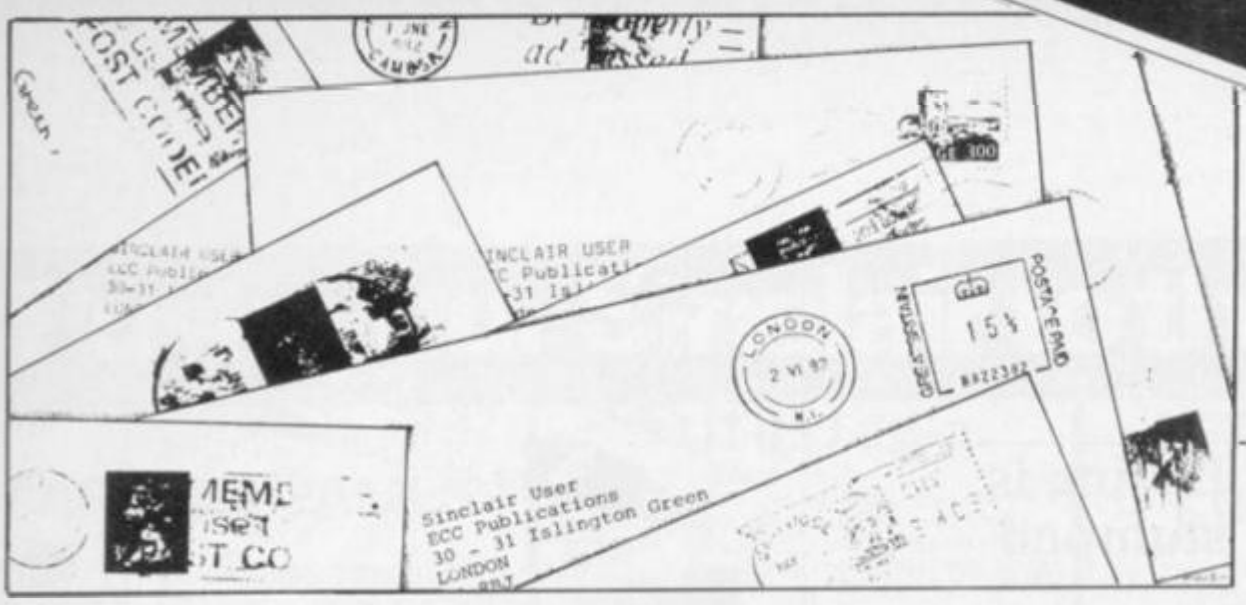


Logical statements

THIS INFORMATION on string arrays and logical arithmetic may be of interest.

Sinclair ZX-81 Basic lacks an IF . . . THEN . . . ELSE statement. In one specialised context, however, this can be mimicked with the use of string arrays, thus saving program space.

Since one cannot have, for example:

IF N = 1 THEN PRINT A$(7) ELSE PRINT A$(8),

one might seem to need two statements:

IF N = 1 THEN PRINT A$(7)

IF N<>1 THEN PRINT A$(8)

In fact, they can both be replaced by the single statement PRINT A$(NOT N-1).

A similar effect can also be produced, so long as N is not zero or negative, by PRINT A$(7 + SGN(N-1)); but that prints A$(6) if N is zero or negative and in any case needs an extra pair of brackets.

The idea can be extended, provided always that the choice is between strings in the same array. For example;

IF N>8 AND N<13 THEN PRINT A$(25)

IF NOT (N>8 AND N<13) THEN PRINT A$(6)

can be replaced by

PRINT A$(25-19*NOT (N>8 AND N<13).

The same can even be done for more than two conditional statements; for example, the four lines

IF A = 3 AND B>4 THEN PRINT A$(7)

IF A = 3 AND B<=4 THEN PRINT A$(8)

IF A<>3 AND B>4 THEN PRINT A$(23)

IF A<>3 AND B<=4 THEN PRINT A$(24)

can all be replaced by the single

PRINT A$(7 + 16*(NOT A-3) + NOT B>4)

with a considerable saving of space.

R W Sharples,
London NW7.

Improving printer

WITH THE FLEX coming out of the edge connector on the left instead of the normal right-hand side, my ZX printer is now non-standard. I believe it is an improvement on the Sinclair orientation. It takes up less space and does not interfere with the keyboard accessibility, either visually or manually. It also has an extremely desirable side-effect, in that the RAM pack stability has improved. I do not know why.

The method of alteration is to undo the two screws on the printer connector terminal and carefully remove the two case halves, keeping the terminal card in the same position. Put the main cable to the opposite side of the terminal card and refold the wires neatly, then reverse the case halves and turn upside down, screw-heads uppermost, fit over terminal card and replace screws.

A Wood,
Blyth,
Northumberland.

User in a bind

HAS *Sinclair User* any plans to sell binders for the magazine? I have bought the magazine from its first issue and I feel that a binder would transform my collection of magazines into a useful text.

Simon Stockdale,
London, N20

• *There are no plans to sell binders at the moment. If a decision is taken in the future we will keep readers informed.*

Pascal convert

COULD YOU tell me if there is a Pascal converter on sale for the Spectrum and if it is possible to purchase a colour printer for the Spectrum?

Kevin Hardy,
Bishop's Stortford,
Herts.

• *A BOOK called* Pascal for Human Beings *is produced by Interface, 44-46 Earls Court Road, London, W8 6EJ. It contains a compiler which turns a subset of Pascal into Basic.*

A colour printer is available for certain microcomputers but unfortunately an interface for the Spectrum to use the printer is not available yet.

Protecting software

THANK YOU for the write-up in the *Sinclair User* December issue regarding the Software Protection Unit. We also, in fact, had an advertisement in that issue concerning the same unit.

Unfortunately there was a rather damaging error in the write-up which had very serious effects. The protection unit uses only six batteries — as indicated in the instruction sheet. That gives a total battery price of £2.14 using Duracells or £1.50 using HP cells. The price you quoted was for eight batteries at £3.34 per set.

The price of the batteries is of vital significance to the success of the sales drive, as the competition uses nickel cadmium batteries.

R J Schmid,
Microbyte,
Lichfield, Staffs.

RAMTOP problem

HENRY EVANSON's question — Helpline, January 1983 — highlights a problem which the Sinclair manual does not make clear. If a program has been loaded into the Spectrum which moves RAMTOP — for example if the machine code in a program

continued on page 20

continued from page 19

is stored above RAMTOP and the space already reserved for UDG is not sufficient — then even if NEW is pressed RAMTOP is not re-set.

In some cases the program, though written entirely in Basic, will require the whole of the RAM — including the area reserved for UDG. If that is the case the error report 4 OUT OF MEMORY will appear after the leader has been read.

To the uninitiated that can be baffling. While all our Spectrum educational software clears sufficient memory automatically to allow the program to load and run irrespective of where RAMTOP was set, not every software house is so helpful. If, therefore, a program which is supposed to fit into your machine does not but displays error 4 you will doubtless find that clear 32767 (16K) or clear 65535 (48K) will, if entered in immediate mode before loading the offending tape, cure the problem.

Peter Forbes,
Kingfisher Software,
Loughborough.

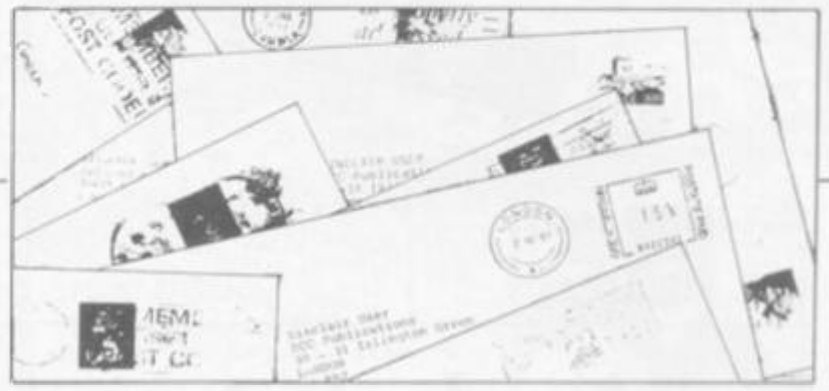
Listing is stumped

AS A KEEN cricket enthusiast. I was interested to see the program submitted by Peter Horlock. Being a new-

comer to the world of microcomputing, I should like to know if that program could be modified to run on my recently-received 16K Spectrum. If so, could you publish a program for cricketing Spectrum owners, of whom there must be a great many among your readers?

Frank Kilburn,
Woodford Green,
Essex.

• *The program would be too big to run on the 16K Spectrum. If, however, any reader has written a cricket program for the machine we would be interested to see it.*



Publisher seeks sports programs

THE EDITORS of a new book to be published soon on *Microcomputers in Sport* are looking for specimen programs which demonstrate the use of computers in sport, recreation and physical education. If you have written, or are prepared to write, suitable programs and would like to submit them for publication, please send them to Dr David Brodie, School of Physical Education and Recreation, University of Liverpool, PO Box 147, Liverpool L69 3BX.

The editors are interested in both simple and complex programs, so do not consider that a straightforward program is not worth submitting. All programs selected for inclusion will have full author acknowledgment in the text and frontispiece. Many readers, young and old, experienced and inexperienced, amateur and professional, must have some programming ideas which could easily be applied or adapted to sport, recreation or physical education. Please respond quickly, as publishing deadlines have to be met, even if only to say that you are working on an idea and need a little more time to develop it.

David Brodie.

Firms receive pat on back

ONE READS constantly of complaints by the public against both hardware and software manufacturers. My son owns a Spectrum and has suffered bad service, in common with many others, but I felt I should write in praise of the following:

Campbell Systems, for keeping its word and sending goods by return.

Kempston Electronics, for rushing an order for Christmas. It could easily have written for extra money but sent the product first.

JRS Software, for redeeming me and supplying an upgrade on Christmas Eve after I had been let down elsewhere.

M D Pritchard,
Southampton.

Home computing is not harmful

RECENTLY I read with amazement the article in the December issue of *Sinclair User* by Chris Reynolds putting forward the view that children using computers will not increase their job prospects. While I would agree that the use of a micro will not enhance a child's prospects in the so-called computer industry, it will be very useful in almost any other job which requires management.

I am a sales manager and find a personal computing capacity invaluable, despite having a mainframe in the company. My programs may not be elegant but they get results in a practical situation.

Do not be misled; an introverted child is an introverted child whatever happens and no-one ever became introverted by using a computer. The real danger is of academics becoming isolated from the world of work.

R Fowle,
St Ives, Cambs.

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To ensure that your expectations are realised, care is taken at every stage to design features into the system to anticipate your needs. For example:
1) Memories are cumulative e.g. 16K and 32K can be added to the **Memopak 16K** or even to the Sinclair 16K RAM pack. 2) The **HRG** firmware allows commonly used constructions (such as scrolling, shading and labelling graphs), to be called by a few simple commands. 3) The **Centronics I/F** converts ZX81 character codes into ASCII and extends the print line to the width of the printer, still using the LLIST, LPRINT and COPY commands.

As one example, a system with 16K of memory and **Memocalc** is all that is required to perform the same sophisticated numerical projections as a computer at 10 times the price. The problem may be as complicated as a cash flow or production schedule, or as simple as household accounts or pocket money budgeting. If your bank manager wants to see a cash flow, then a single print instruction to the **Centronics I/F** will give a printout which is more than acceptable.

The example system which is shown, on the other hand, would satisfy the needs of someone who wanted to enter data

How it all fits together

You can see from the diagrams how various Memotech/Sinclair units can be combined.

otech, tial of your ZX81...

MEMOPAK HRG This pack breaks down the constraints imposed by operating at the ZX81 character level and allows high definition displays to be generated. All 248 × 192 individual pixels can be controlled using simple commands, and the built in software enables the user to work interactively at the dot, line, character, block and page levels. Scrolling, flashing and animation are all here.

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MEMOCALC The screen display behaves as a 'window' on a large sheet of paper on which a table of numbers is laid out. The maximum size of the table is determined by the memory capacity, and with a MEMOPAK 64K a table of up to 7000 numbers with up to 250 rows or 99 columns can be specified. Each location in the table can be either a number which is keyed in or a formula which generates a number.

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MEMOTECH KEYBOARD

The Memotech plug-in Keyboard plus buffer pack takes the effort out of data entry for ZX81 users. The Keyboard has a light professional touch and is housed in an elegant aluminium case. The simple plug-in system means that you are not obliged to open up your ZX81, use a soldering iron or invalidate your ZX81 warranty.

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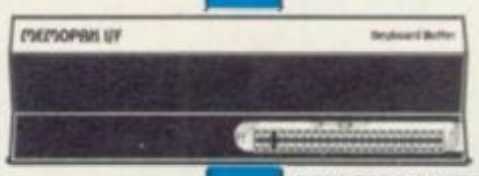

KEYBOARD BUFFER PAK
The Buffer Pak performs a "housekeeping" function for the Keyboard, interfacing directly with the port at the back of your ZX81.

via a light-touch keyboard, construct and label graphs, and then copy the screen to an 80-column printer. Only 16K of memory is shown here but with additional memory, more than one video page can be stored. Up to 7 pages can be displayed in rapid succession to give animated displays.

Looking forward, **Memotech** will continue to back the ZX81 through 1983 with fast storage devices, pressure sensitive electronic drawing boards and more software packs including a **Wordprocessor,** an **RS232 Interface** and a **Z80 Assembler.**

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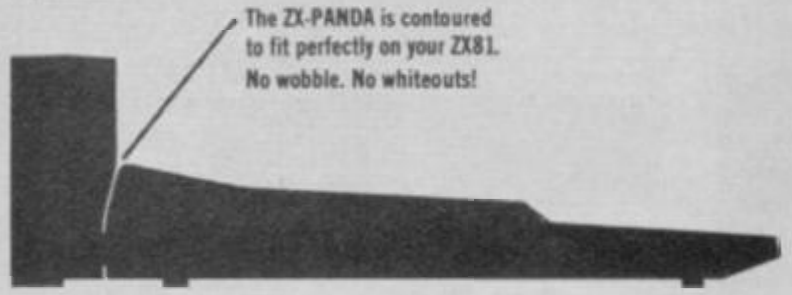

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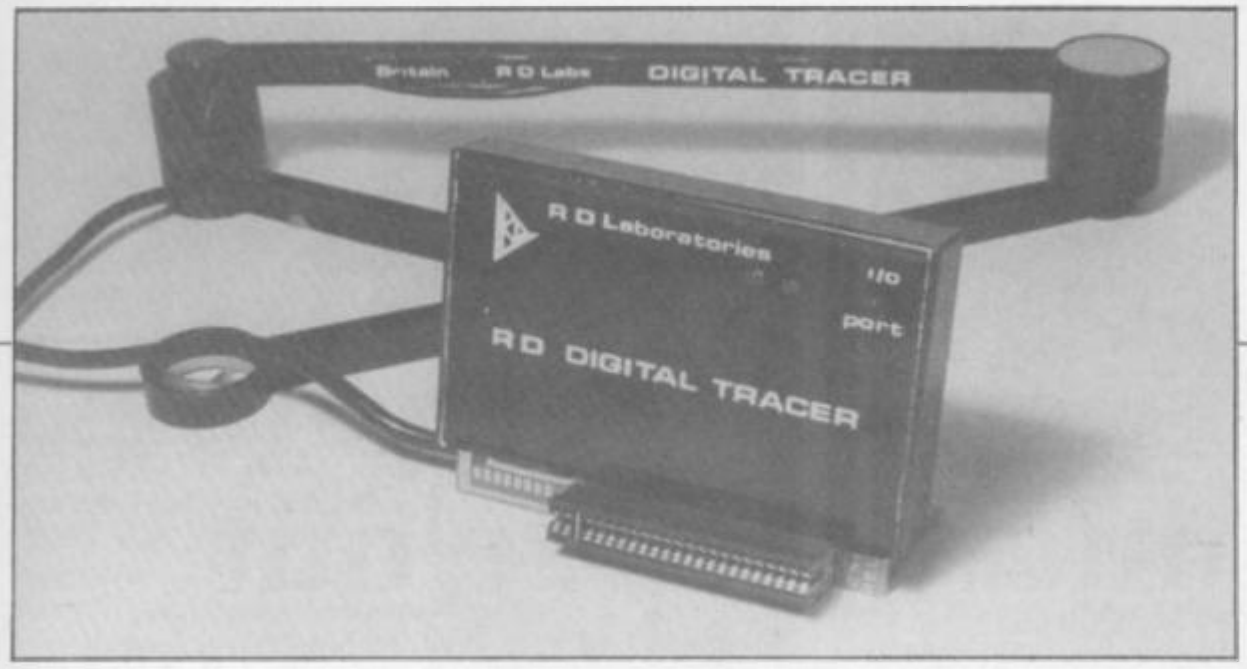


Tracing made easier

ONE OF the most outstanding achievements in the graphics field is the RD tracer, a device which allows you to draw across a piece of paper with a cross hair — like a rifle sight — and have the computer copy the same thing on to the screen. The three-part arm needs to be fixed to the board on which you are working by the sticky strip provided — or Blu-tack. A template is provided to allow you to line up this and the graph-type map over which the arm works.

The map is marked in pixels and PRINT positions, so that letters and numbers can be added to the drawing. The interface black box, which contains an edge connector and PCB continuing strip, plugs into the expansion port of the ZX-81 or Spectrum. As it fits both computers it has only a 23-way edge connector and must therefore be used in the same way as the printer — placed after any Spectrum equipment.

On the ZX-81 it is memory-mapped into location 15391; on the 48K Spectrum it is input/output mapped (port 31), but if required on the 16K Spectrum it can also be memory-mapped via an adaptor. LEDs are provided on the module to indicate when it is being used and also if it is being used on the input/output map.

The tracer tape has ZX-81 and Spectrum programs on the same side. That is satisfactory for the Spectrum but ZX-81 owners should locate the ZX-81 program before attempting to LOAD the program.

The tracer has four programs for the Spectrum and two for the ZX-81. For the Spectrum the tracer can be used to create lines, circles or just to follow the trace of the arm in all the colours available. The drawing can them have areas "painted" in or shaded in the same or a different colour.

One thing to remember is that each character square can have only two colours. All the commands are available by one key press and the entire program is written in Basic so that it can be customised easily.

The other use of the tracer is to input data in the form of co-ordinates for graphs; they can be stored as strings and the tracing program made to execute the co-ordinates one after another, creating an automatic drawing routine.

The pictures can be saved on to tape from within the program and can also be loaded back for modification. The cost of the tracer is £55.50 with 10 per-cent discount for cash. It is available from RD Labs, 5 Kennedy Road, Dane End, Ware, Herts SG12 0LU. Tel: 0920 84380.

The drawing can be scaled to give a 3D effect, with the program taking care of the perspective. With user-definable graphics plus text and the tracer producing any other shapes, all kinds of pictures can be created.

EPROMs for Spectrums

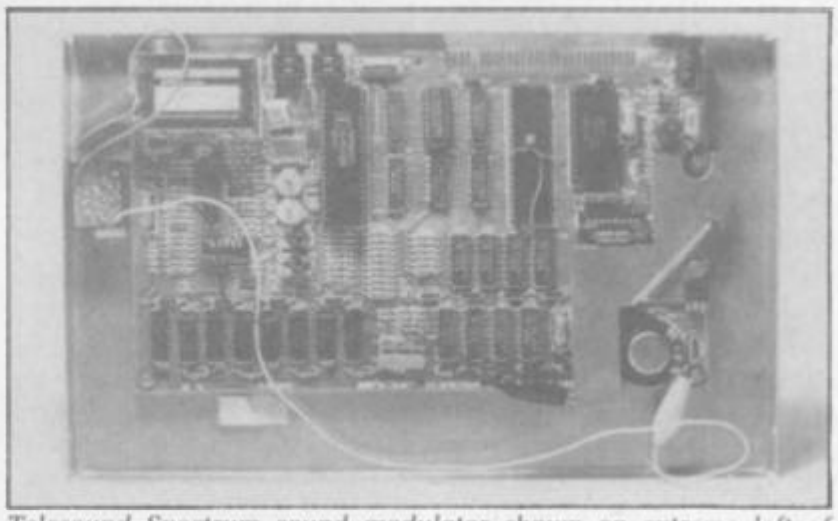
EPROM SERVICES has produced a Spectrum version of its EPROM board for the 16K Spectrum. It is in the top 8K of memory from 56K to 64K which is normally empty. It consists of four sockets on a board, to which can be added static RAMs — 6116 type — or 2K EPROMs — 2716 +5V type.

As yet there are no EPROMs available for the Spectrum but some will soon be available.

EPROM 1 contains 10 small routines for program editing such as block delete, delete up/down from a specified line, renumbering.

Only the lines, — no GOTOs or GOSUBs — and

continued on page 26



Telesound Spectrum sound modulator shown on extreme left of Spectrum board

Sound improvement

TELESOUND 84 is the latest version of the sound modulator for Spectrum, ZX-81 and the BBC computer. There is a reduction in size to ¾in. x ½in. x ½in. and the length of the leads which connect it to the computer is much-improved. The sound quality is also better and because of the connection by clips to the circuit it can be removed easily.

The Spectrum BEEP is now amplified by the TV set and is loud enough for anyone. The cost of the Telesound 84 is £9.95 from Compusound, 32 Langley Close, Redditch, Worcs B98 0ET. Tel: 0527 21438.

continued from page 25

various checks on the memory, such as program length.

The next 12 routines are for entering machine code into REM statements, in hex only, and extending and modifying both the machine code and the REM statement. There is also a very useful hex dump facility to view an area of memory which gives eight columns of hex addresses and the data in them.

Sixteen more routines contained in the same EPROM deal with the screen display and, together with a 2K RAM stored at 14K-16K on the same board, allow you to store machine code on TV screens in non-Basic RAM to be recalled later. That makes a total of 38 routines in one 2K EPROM.

EPROM II concerns tape routines, including a RAPID load and SAVE. The other routines allow you to verify and identify a Sinclair SAVEd program.

EPROM IV contains a very good ZX-81 monitor program. It requires also that the board be fitted with 2K of RAM at 14K-16K to store the monitor screen, stack and scratchpad. All the system variables are saved and the various Z-80A registers can be set before entering a machine code routine.

The Spectrum EPROM board also has the facility to be switched out of the memory map by input/output port. It has a blank 2K EPROM fitted — EPROM 1 — and costs £19. EPROMs II to IV cost £10 each and are available only for the ZX-81 at present. Eprom Services is at 3 Wedgewood Drive, Roundhay, Leeds LS8 1EF.

Basicare turns the micro inside out

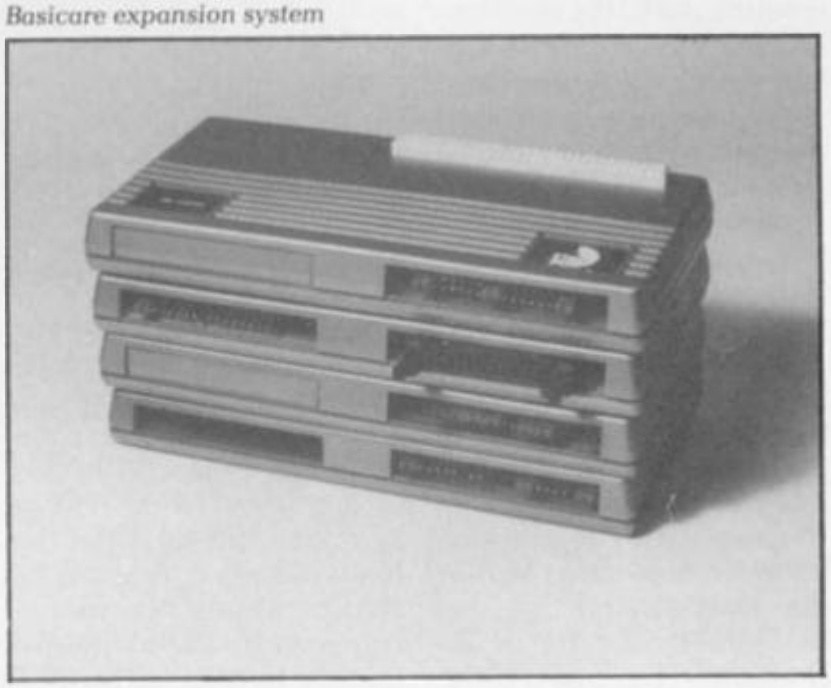
BASICARE seems to be intent on revolutionising the world of microcomputing by providing all the facilities of a computer except the CPU and the language outside the micro. The system contains RAM and can be extended to Centronics printers, character generators, battery-backed RAM, RS232 with no worry about where to fit them in the 64K of the memory map of the ZX-81.

When fully-expanded the Basicare system could have 112 peripherals, divided into SLOTs on each page of the memory map. Sixteen pages of 32K worth of dynamic memory, 512K of memory for use by Basic or machine code, four 8K areas of DATA plus four 8K areas of TOOLKIT routines — ROM/RAM or battery-backed RAM. Total memory size of the system is 576KB. Since they take up most of the expense of any system, Basicare has made them compatible with most computers by linking them via a 64-way edge connector. The computer is connected to that bus via a PERSONA module, which fits into the computer memory map. That way the modules can remain the same; it is only the position on the memory map which changes.

The basic system must consist of a computer — at present the only PERSONAs available are for the ZX-81 and the Spectrum — and the PERSONA for that computer.

Having established the system for accessing all those extra boxes, you are still limited to 64K of memory map — 8K or 16K ROM, 8K for SLOT and PATH areas, and the rest can be RAM unless you buy a MINIMAP module to switch the pages in the system. That would seem essential, otherwise there are many other cheaper systems which stay within 64K.

Basicare expansion system

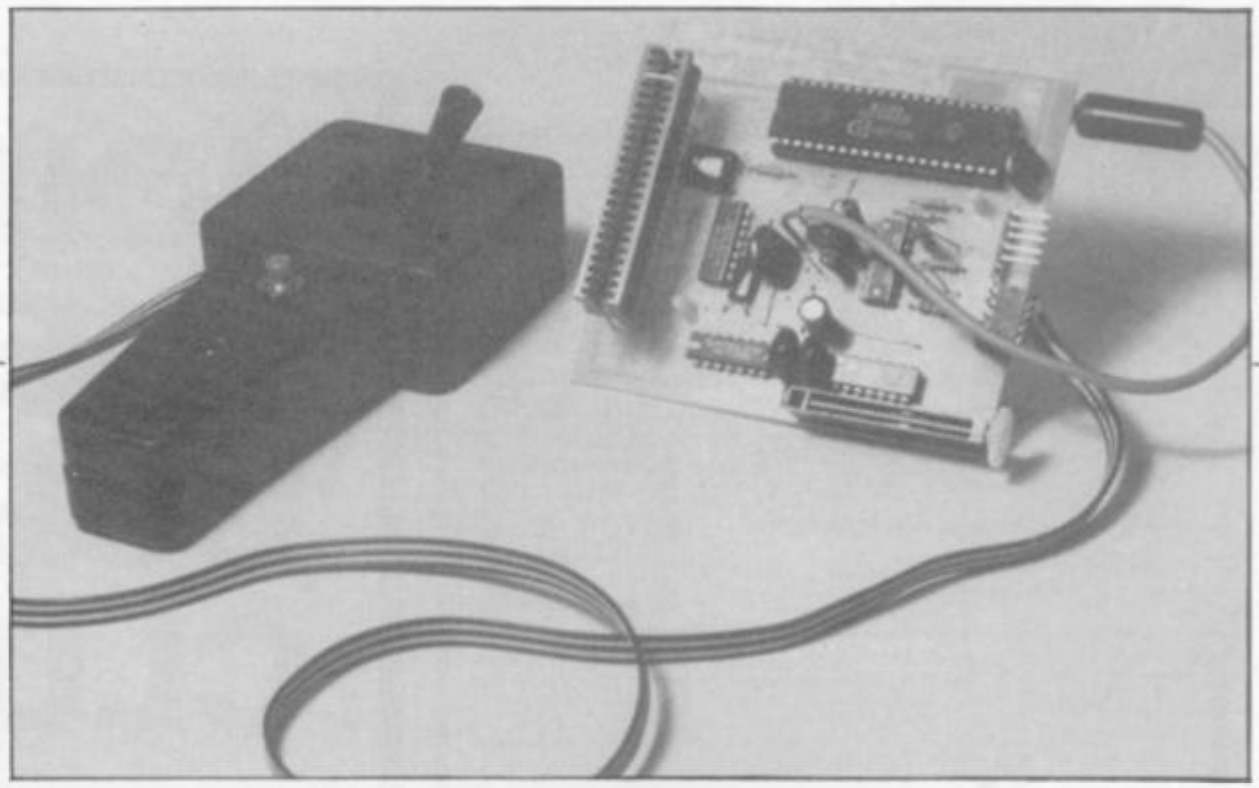


Extra memory may be added in 16K or 64K dynamic portions or 2K chips of static memory. Dynamic memory can be used only in the 16K-32K and 48K-64K regions of the memory map. The RAM pack containing static chips may have a USER-FRONT option fitted to allow you a programmable character set.

The SLOT area in the memory map — 44K-48K — is used to store all the input/output devices such as Centronics printer module — Pericon c — and the two types of 24-line input/output ports available — Pericon a and b. The SLOT is also used to access the MINIMAP by POKEs to change the pages. Another 4K area, called PATH, is not specified in the documentation and presumably will act like the BBC computer TUBE interface to connect to other micros.

The file area — dynamic RAM — can be used to hold segments of a program like subroutines. Those subroutine pages can be called by a Basic POKE to change from one routine to another.

Basicare Microsystem Ltd is at 12 Ricketts Street, London SW6 5EL, tel: 01-385 2135.



The games companion

Repeat key for ZX-81

AN AUTO KEY repeat key module is available for the ZX-81 which works in the same way as the Spectrum — 1.5 sec. delay before repeating. It is soldered on to the ZX-81 via nine wires and rests inside the case underneath the keyboard. It is not the same design as the Haven Hardware module. It works just as well as the Spectrum and provides a clean action.

TV Services of Cambridge makes the device and it is sold by that company and Kempston Electronics at £6.50 including postage. TV Services is at Chesterton Mill, Frenches Road, Cambridge CB4 3NP. Tel: 0223 358366.

PROGRAM POWER has produced what seems to be an all-in-one module which contains joystick, soundboard and amplifier. The amplifier can also be used to boost the weak BEEP of the Spectrum up to a full two watts via the volume control. The board is not cased and fits ZX-81 or Spectrum, although the ZX-81 user will have to write some machine code to use it.

The board does not have a continuing strip at the back, so place it last.

A demonstration tape is provided with every purchase and allows you via Basic to hear a selection of pre-set sounds and to be able easily to alter the sound registers one by one. The sound chip also contains an input and output port and they are used to run the joystick.

The joystick is not the switched type, however, and gives a position back in the form of two numbers X and Y. The fire button results in setting a variable to 1 if pressed and all the joystick commands are accessed by a machine code routine for greater speed.

At present you have to put together the joystick, as it arrives only as a kit. The instructions are easy enough to follow but it requires soldering and the screws which hold the case together seem difficult to fit.

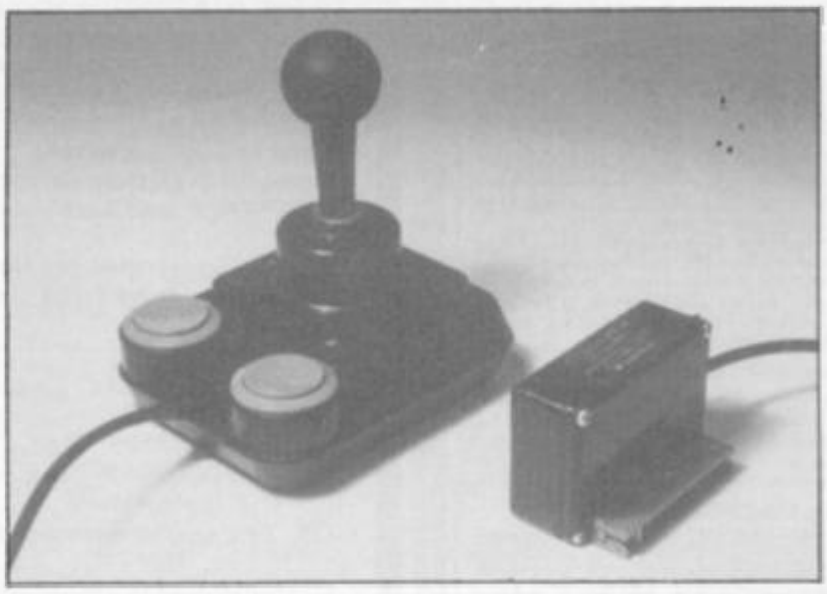
The system works very well and as it contains its own loudspeaker and is driven from the Spectrum or ZX-81 power supply, it should do very well.

Micro Power sells the sound board for £24.43 and the joystick for £6.53 inc. case or £4.55 without, all inc. VAT. Micro Power is at 8/8a Regent Street, Chapel Allerton, Leeds LS7 4PE. Tel. 0532 683186.

Joystick from Kempston

KEMPSTON (Micro) Electronics has a joystick of the switch type for the ZX-81 or Spectrum. It is a Competition-Pro joystick and is input/output-mapped by A6 being low. The joystick has a solid metal shaft and is spring-loaded with a black balled top. The two red fire buttons are about one inch in diameter and both produce the same result. The joystick can be in eight positions as the leaf springs used will both operate if moved in a diagonal direction. The joystick gives 8 for down, 4 for up, 1 for left and 2 for right. So up/right will give 6 and the joystick fire buttons both give 16.

The interface is "dead-ended", so it must go on after any other equipment, but it is attached to the joystick by 5ft. of cable, so that should not be a problem. Software is always important to an item like this and Kempston already has four programs which can use the joystick, from Abbex, Quicksilva and Softek. Gulpman has also been converted for use with the joystick. When you buy the joystick you also get the listings of three programs provided free — one Space Invaders, a hi-res drawing program and a program to mix with the Bat and Ball game provided on the Horizon tape. The joystick costs £25 inc. VAT from Kempston Electronics, 180a Bedford Road, Kempston, Bedford MK42 8BL. Tel. 0234 852997.



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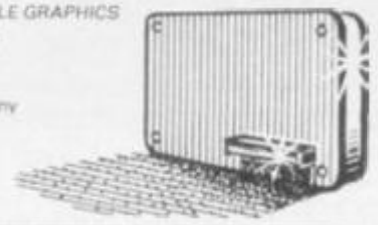

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Word work on Spectrum

THE FIRST word processor to be produced for use with the 48K Spectrum is from Tasman Software and called Tasword. It includes most of the facilities available on larger machines, such as automatic word wrapping, left and right justification, insertion and deletion of lines and words, and cursor-controlled editing.

Text files can contain up to 900 lines and each text file can be saved independently of the program. It is also possible to merge text files if sufficient room exists within the program. The program has an example text file saved after it on the tape. That allows the user to pracise with the control key before typing-in a new text file.

The user manual has been set using the justified print of the ZX printer and is very easy to read and understand. Unfortunately that only shows the inadequacy of the Sinclair printer and the word processor package needs a dot matrix printer to demonstrate its true value.

Tasword is to be upgraded when the Microdrive and RS232 interface arrive and that will be offered to existing owners of Tasword at a reduced price.

The package is worth the money and with the additional software to follow will prove useful to anyone with reports or letters to write. Tasword costs £7.95 and is available from Tasman Software, 17 Hartley Crescent, Leeds LS6 2LL.

Get your teeth into this one

YOU MUST hunt down and destroy Count Dracula in this new adventure game, **Transylvanian Tower,** for the 48K Spectrum. There are five levels to Dracula's castle and as you move around each floor the rooms you enter are shown in 3D.

The first level of the castle is a simple maze. At any time you can call-up a floor plan with your present position and destination marked on it. When you reach the exit you can go up to the more dangerous level two.

Vampire bats swoop to attack you and you must kill them with your gun. Your shots must be accurate as you have only 10 bullets. You can also kill bats with the objects you will find scattered about the place.

On level two you can ask for a floor plan only when you kill a bat. To get through this level you need to kill plenty of bats.

Level three is the same as level two but the bats must be shot through the heart; level four is the same as level three. Level five is the most important and dangerous one. Here you must hunt the dreaded Count. Only one of the objects which you have collected from the other floors will kill him. The rest are useless but you are not told which is which.

When you have killed Dracula you are given a map on which is marked the location of his treasure. You must still tread carefully as the bats are furious with you for killing their master.

This addictive game is available from Richard Shepard Software, 22 Leys, Maidenhead, Berkshire, SL6 7EZ. It costs £6.50.

Starters get code bug

ZX BUG is a machine code monitor and disassembler for the 16K Spectrum. The program uses hexadecimal, base 16, to display numbers such as addresses and operation codes. That makes it easier to program in original code but a hex to denary, base 10, converter would have been helpful in the package.

The disassembler displays information in a series of fields, or areas, on the screen. The address of an instruction is displayed first, followed by the hex representation of operation and operand, the number to be processed by the operation. On the other side of the screen the hex is translated into mnemonic form.

The monitor part of the program will translate messages into hex and store them in memory, display register and alternative register pairs and run machine code programs.

The program is ideal for machine code beginners as it is simple to use. It is available from Artic Computing, 396 James Reckitt Avenue, Hull, HU8 0JA. It costs £6.95.

Submarine adventure

FOR ANYONE who likes playing sub-chase arcade games a new game for the 16K Spectrum, **Sub Track,** is ideal. You are the commander of a ship which sails from right to left across the screen. Lurking in the sea beneath you are submarines which release their mines trying to

continued on page 32

continued from page 31

destroy you. You have 90 seconds in which to dodge the mines and to drop your depth charges on the submarines.

The game has a definite arcade feel to it and Sub Track costs £4.95 from Amba Software, Freepost, Cambridge, CB3 7BR.

Novel database from MiCROL

A NEW TYPE of database has been produced for the 48K Spectrum by MiCROL, a company which deals in quality business software. The database is particularly interesting because it does not use a menu in the central control structure.

As a result of that it is important that the user reads the manual which is issued with the system. The manual is simple to understand and will have users storing information in the system in a matter of minutes. Unfortunately, in the beginning users may have to refer to the manual for command words, as the program has no help page. That is not a major problem and once the system has been used twice, it is easy to remember the commands.

It is possible to store several blocks of information, called documents, in one file. Each document can contain 999 lines of data. The number of lines left is displayed at the bottom of the screen if the user needs it.

It is a brave attempt at trying to change the concept of a database and we think that it has worked. It is available from MiCROL, 38 Burleigh Street, Cambridge CB1 1BR. It is excellent value at £9.95.

Colour moves on the breakout

SUPERBALL is a very colourful development of that old arcade game Breakout for the 16K Spectrum. You are given three black balls and have to break through the wall of red and yellow bricks to unlock two gates on the other side of the wall. When you have penetrated the brick defences you have to hit the ball at such an angle that it will hit the side of the game board where the small black gates are. There is one gate on either side of the board.

When you have cleared the bricks and opened the left-hand gate you earn a second ball. That means you have to keep both balls in the air at the same time. If you are able to do so you will be given a third ball which joins the other two balls to make life impossible for you. You can leave the extra balls but you should keep the black one in the air to continue playing.

Labyrinth is an 3D maze game, also for the 16K Spectrum. You must find your way around the maze and the quicker you do it the more points you score. At any time during the game you can ask for help and a map of the maze is

shown, with your position and those of the entrance and exit on it.

At the end of the game you are asked if you want to see your path through the maze, again using the help map. You can also see it in fast motion if you hold down one of the keys on the keyboard.

Labyrinth, and games like it, were interesting and had amazing graphics for the ZX-81 but they are mediocre on the Spectrum.

Superball costs £4.95. and Labyrinth £4.95. They are available from Axis, 71 Brookfield Avenue, Loughborough, Leics., LE11 3LN.

Getting in odd words

SPEECH SYNTHESIS is becoming a well-researched area on the Spectrum and the Qucksilva digital speech package **Speakeasy** is a quality software device which enables a user to program a voice or music into home-made programs.

The program is loaded and a tape is made of the speech or music needed. That is then played into the Spectrum, using the load leads, while the program is in 'record' mode.

When the playback key is pressed the sounds will emerge from the Spectrum speaker or through a loudspeaker. The user may have to 'record' the sounds several times for a good-quality voice tone through the computer speaker.

When the quality is satisfactory, the sounds can be edited and specific

sounds can be isolated using the start-of-sound and end-of-sound commands. The voice routines can then be put into ordinary Basic programs.

Quicksilva is at 92 Northam road, Southampton, SO2 0PB. Speakeasy costs £4.95 and L-Game £3.95.

Eddie and the Spectres

SPECTRES is a game with an original approach to the Pac-man concept for the 16K Spectrum. In this excellent game the ghosts are of the white sheet variety and the player takes the part of an electrician putting light bulbs around the haunted maze. The bulbs are lit when the electrician, Eddie, reaches one of the generators set in the corners of the maze.

The light generated in the maze weakens the ghosts and gives the electrician more time to plant light bulbs.

Spectres is available from Bug-Byte, 98-100 The Albany, Old Hall Street, Liverpool, 13 9EP. It costs £5.95.

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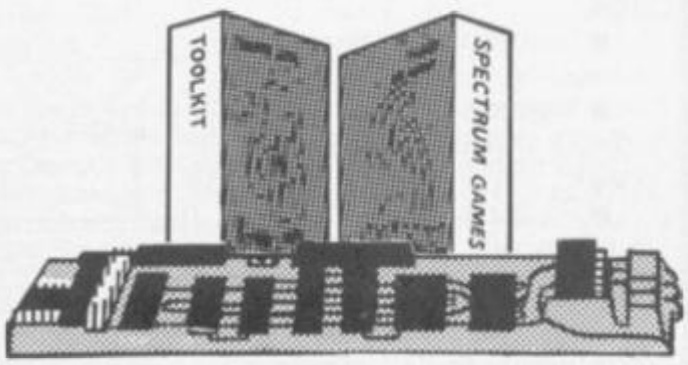

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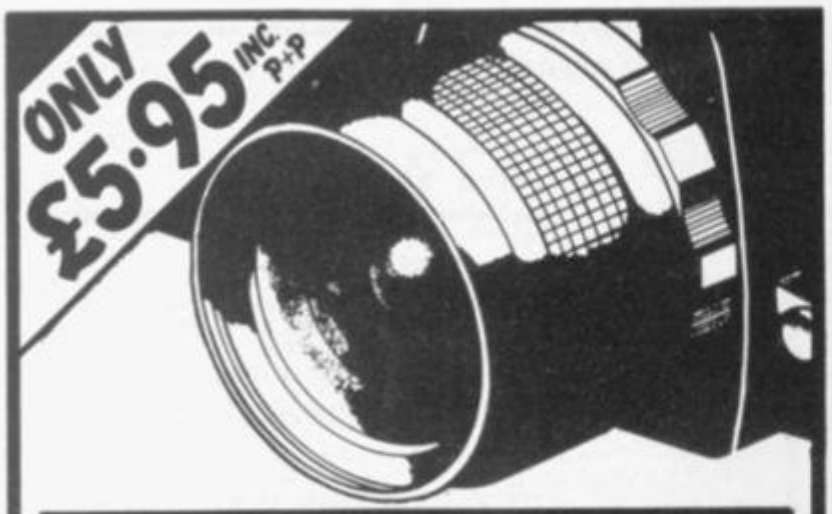

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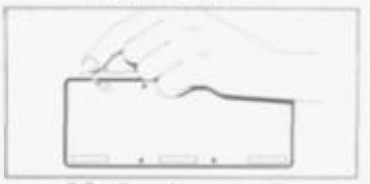
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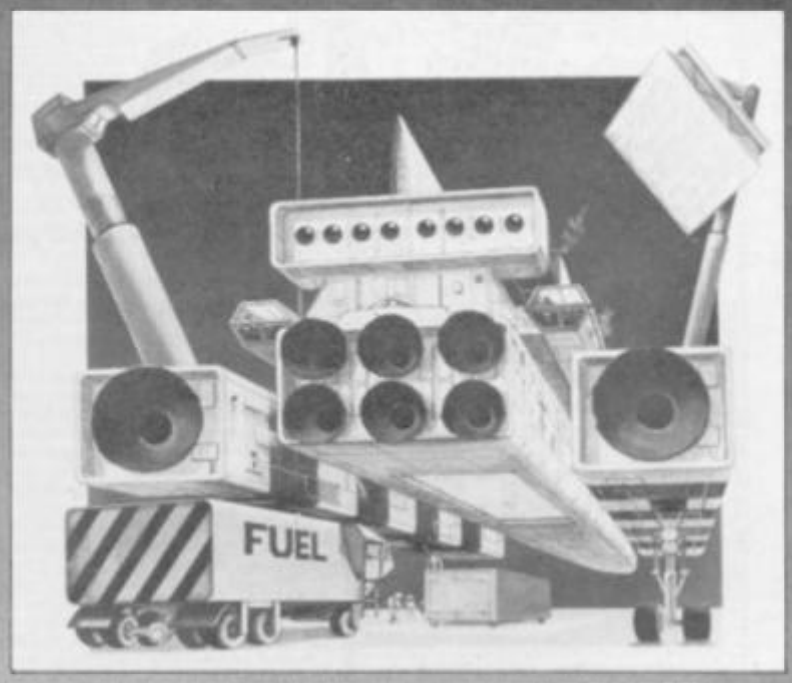

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Chris Reynolds' article in December on the possible dangers of microcomputing provoked a good deal of response. J R Bird argues that the conclusions are incorrect

Hooked on arrogance

COMPUTING is much more than programming. It is concerned with the flexible use and application of ideas. The ideas are structured logically by means of a language.

That is one of the reasons why many of the conclusions of Chris Reynolds in his article in the December *Sinclair User* — Code Junkies Hooked on Micros — are incorrect. Although much of what he said was valid, the tone was prejudiced and negative.

All the problems of vocational computer training were blamed on owners of the home computer. The only slight comment in favour of the powerful little machines appeared in the last paragraph but even then they were dismissed as little more than games machines.

To condemn home microcomputer owners as potential code junkies — people with an addictive perverse interest in computers — probably as failures in academic life and as unemployable is a form of professional arrogance. Most people who have an interest in computing also have other interests.

It is the same arrogance which leads many people to claim exclusive rights to comment on particular branches of knowledge, especially how those branches will develop in the future.

There are likely to be many problems associated with the future in areas such as jobs or careers, leisure and education. None of those can be answered by any one group, be they teachers, employers, lecturers or workers, claiming they have the exclusive right to comment and decision-making.

Neither should Reynolds be advocating novice students in computing. That kind of logic is rather like a professor of French insisting on novice speakers — those who do not speak yet — if he is going to produce good speakers of French.

A teacher of a foreign language must take account not only the students' own language but also their development within that language.

If a student has had experience of a computer language it is reasonable to expect lecturers to take it into account. If specific languages cause problems, the lecturer must identify the problem and work out ways of overcoming them. A lecturer should not advocate novice students; it is no solution.

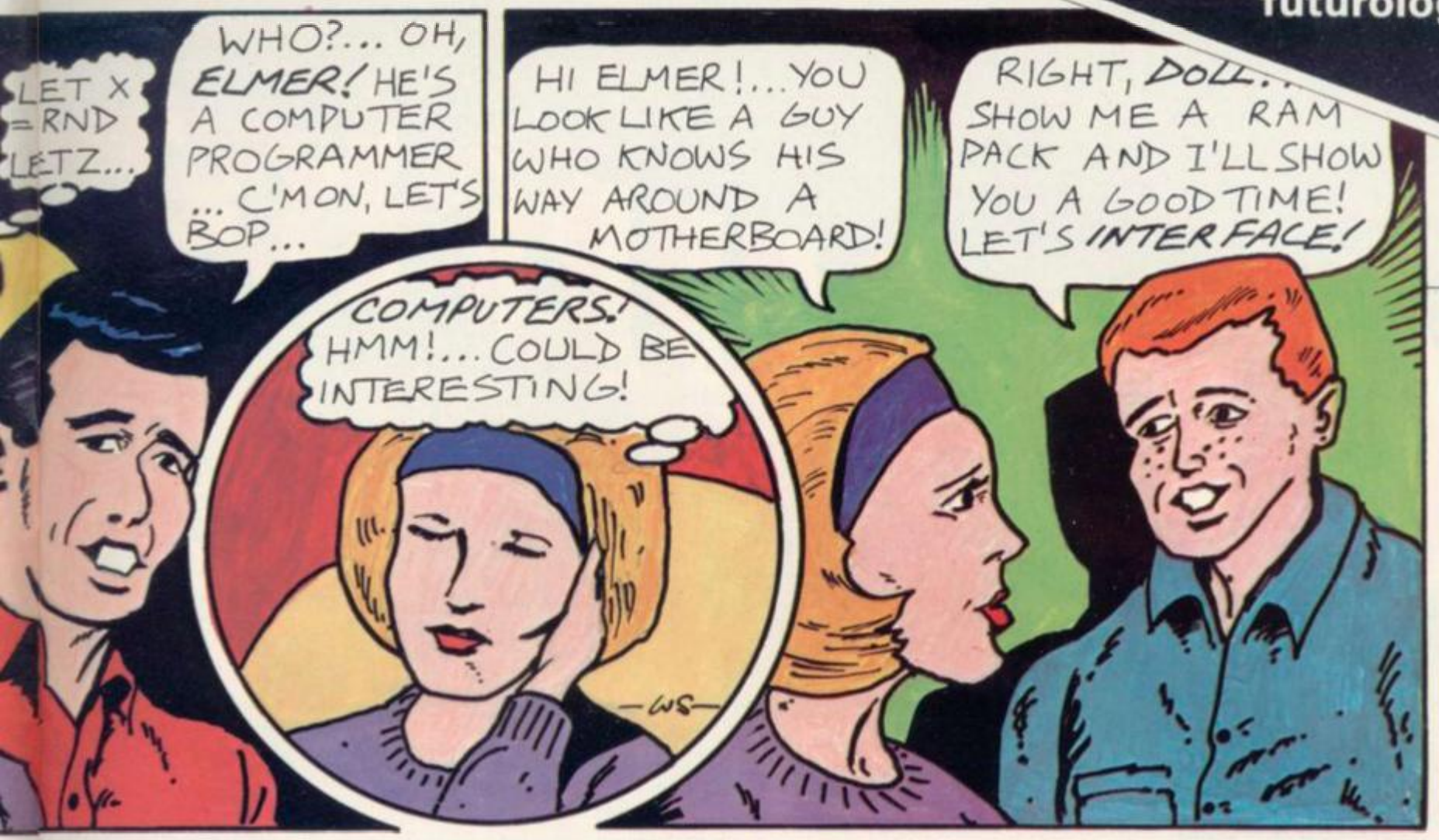
There is a clear and unfortunate rift between academics and non-academics, professionals and amateurs. Academics tend to be more concerned with protecting their access to knowledge rather than sharing it. Professionals seem to be more concerned with keeping their right to knowledge rather than sharing it with amateurs.

Computing at a high level is for a small number of highly-qualified students and to suggest that the needs of those few are best-served by denying the vast majority of home micro owners use of their leisure time activities is wrong. Academics appear to see things in one of two ways. Either they are shut in ivory towers researching and learning for pure knowledge, or are selling their ability to industry.

While I would not subscribe wholly to that view, I wish the apparent rift which contributes to it did not exist.

With the introduction of new technology, people will find vast changes in their life-style; work may never be the same again. The concept of five to 16 education being sufficient may disappear; re-training several times may become the norm. Leisure may become more widespread — leisure which will demand the use of new technology. If many of the problems of the future are to be solved, the rift between the academic and non-academic computer user has to be bridged for the benefit of both the average microcomputer owner and the academic

'To condemn micro owners as failures in academic life and as unemployable is a form of professional arrogance'


LET X = RND
LETZ...
WHO?... OH, ELMER! HE'S A COMPUTER PROGRAMMER ... C'MON, LET'S BOP...
COMPUTERS! HMM!... COULD BE INTERESTING!
HI ELMER!... YOU LOOK LIKE A GUY WHO KNOWS HIS WAY AROUND A MOTHERBOARD!
RIGHT, DOLL... SHOW ME A RAM PACK AND I'LL SHOW YOU A GOOD TIME! LET'S INTERFACE!

professional. Most people with home microcomputers would not suggest that their work with the computer would change the world but they would not suggest that those with computer PQX were inferior to them or that all mainframe work was necessarily superior.

The assumption common to many vocation-minded computer studies/computer science lecturers, that their work was important simply because they train professional workers, is to misread the future. Before long, the day of the large 'brain' will be over and the day of the small, powerful computer will begin.

It is also clear that plain language or even interactive voice computers are on the way. When the man in the street can talk to a computer and ask it questions, the mystery of the languages probably will disappear. Before that day arrives, however, we have the problem of many computer languages, but it is surely not beyond the understanding of professionals in the computer field to structure courses to take that fact into account.

I notice that the Open University is to use a further form of Basic in its course Computing and Computers. I am not condemning the intellectual level of the OU course but rather regretting the introduction of yet another dialect.

Even with the limitation of the new OUSBASIC, the Open University is showing the way to other universities and polytechnics. The course has been designed to introduce beginners to skills and techniques of computing. Most micro owners would concede that their programs and computing would be improved for a better knowledge of structure and logic, not to mention better techniques.

So, in effect, what we have is a university or polytechnic department with the skills and resources to teach both the structure and techniques to improve the standard of home micro owners. Alongside that pool of skill we have a large number, perhaps some half-million at the moment, who would no doubt welcome some of that skill being taught to them.

What better way of bridging the academic, professional and non-academic amateur rift than bringing the two together?

That would create a new area of non-vocational studies for the institutes of higher education. As a spin-off, it would also retain in those institutions some of the teaching jobs which are disappearing under the present retrenchment in the higher education sector. Second, it could even earn money for the institutes involved. Mainly, the positive effect of academics getting together with people from all walks of life would inevitably broaden the outlook and experience of teaching staff.

> 'The positive effect of academics getting together with people from all walks of life would broaden the outlook of teaching staff'

Clearly there would be advantages for the students of such courses. They would learn better techniques, they would learn better ways of using computers, they would learn other computer languages, not to compete with the professionals, but to use in their private studies.

Further, those courses could be extended to include information and control technology and how it can be developed, designed and used.

The interaction between micro owners and the professionals, both at the formal teaching and informal social levels, could only benefit both. Experience from both sides could stimulate more courses and lead to a leisure time education industry.

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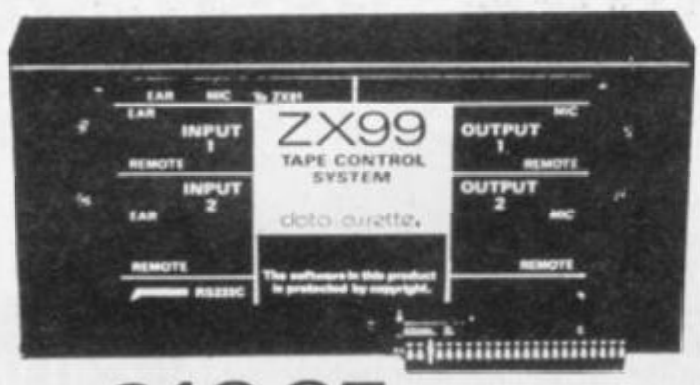

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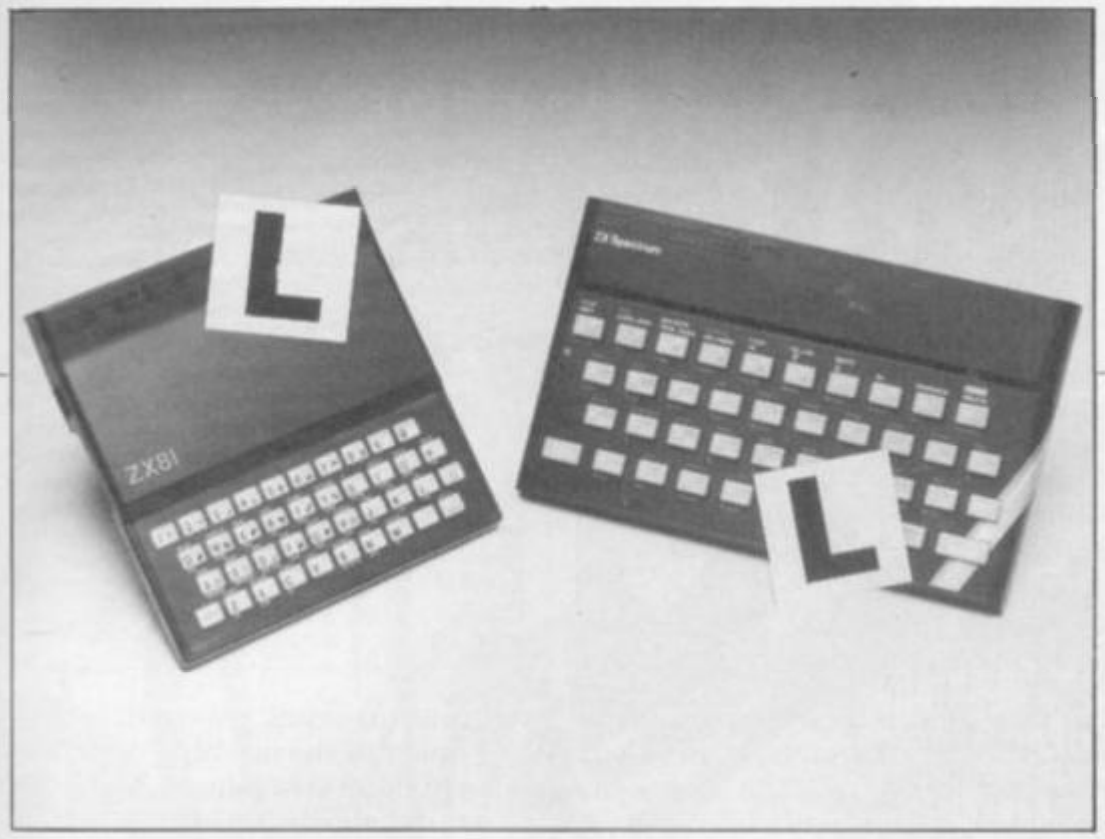

Our easy-to-follow guide for new owners of the ZX-81 and the Spectrum

The basic route to a habit-forming hobby

BUYING a Sinclair machine can be the start of a life-time's obsession with home computing. It is easy, however, to become discouraged if everything does not go according to plan from the beginning.

For those with only a little knowledge of computers and their capabilities, the best way to approach the machines is to abandon any ideas for special uses. While the 48K Spectrum is big enough for simple uses in small businesses, the range of Sinclair computers does not contain machines for major uses. It is better to become accustomed to the many facilities and then decide how you wish to use them.

Begin by unpacking your machine, overcoming your surprise at its size and weight and, following the manual, set up the system. If you cannot get the K on the screen, check that everything is plugged into its correct socket and re-set the machine by pulling-out the power plug for one second and try tuning-in again. If still nothing appears, check the power supply unit by shaking it. If it rattles, return it. If it is satisfactory, check your system with that of a friend.

If you have a Spectrum you will have received an introductory booklet which explains what the computer can do and giving detailed instructions on how to set it up. Also included is a fault-finding guide.

Once the K appears you are ready to begin learning about your machine. It can prevent family arguments if you can afford a separate television set for your systems. It also makes life easier if you find somewhere to leave your equipment set up permanently. You will find that a few power sockets are needed and a four-way block connector on a short length of extension cable will help to tidy training leads.

'For those with only a little knowledge the best way to approach the machines is to abandon any ideas for special uses'

When using a Spectrum, a television set has to be more finely-tuned than when using a ZX-81 because of the added dimension of colour. If the set is not tuned properly, the colours will look hazy instead of sharp and clear. If no colour can be seen when it is switched on, the power supply or the television may be at fault.

Some users have experienced some difficulty with some television sets, which include Hitachi, Grundig and Toshiba. Sets which many people have found compatible include the Sony Trinitron, Fidelity and Ferguson.

The manuals are written in great detail and are reasonably easy to follow. Some of the chapters may not seem immediately relevant but it is worthwhile reading them as you might miss something important.

Patience is needed at that stage to learn the ways in which the computer will accept information. It is tempting to try to enter programs before you are ready but that is likely to lead to errors. For example, words like AND, THEN and AT should not be typed-in letter by letter.

By the time you have reached chapter 11 in the ZX-81 manual and chapter 19 in the Spectrum manual you should have accumulated sufficient knowledge to be able to type-in other people's programs, such as those in *Sinclair User* and *Sinclair Programs*, without too much difficulty.

It is important that when using the ZX-81 it is not jolted. Some of the connections can easily work loose and everything which has been put in will be lost.

The manuals are not to everyone's liking and if you find them difficult to follow a number of books on the market can help you. Find the one which suits you best.

As a way of relaxing you can buy some of the growing range of commercially-produced software. That can be loaded directly from cassette but make sure that your machine is big enough to take the tapes you buy.

For the ZX-81 there are a few tapes for the unexpanded 1K machine but the majority require the 16K RAM pack. Similarly on the Spectrum most companies are taking advantage of the possibilities

continued on page 44

continued from page 43

provided by the larger 48K machine rather than providing cassettes for the 16K.

The tapes can vary in quality and it is advisable to read the reviews in *Sinclair User* and use your judgment to find the best.

An alternative method to learn about both the ZX-81 and the Spectrum is to plunge in at the deep end and see what the machines will do. Refer to the manuals when you have difficulties. You can ignore the functions and calculations initially and experiment with PRINT statements to obtain the feel of the machines.

You may already have heard about the problem involved in SAVEing and LOADing your own cassettes. The manual gives detailed instructions but many of the early ZX-81s would not accept tapes from some recorders. That problem is said to have been overcome but there can still be difficulties. Usually they occur when LOADing tapes recorded by other people. One simple method to over-come this is to wind the tape to the middle of the program and type LOAD " " followed by NEWLINE; then increase the volume of the recorder slowly with the tape running until the television screen shows four or five thick black bands. If you then re-wind the tape, the program should LOAD normally.

LOADing and SAVEing on the Spectrum is much easier and faster than the ZX-81. One difference is that when SAVEing on the Spectrum the LOAD lead must be disconnected either at the recorder or the Spectrum.

Finally, a health warning. Apart from any practical uses, computing with your Sinclair machine can be a very entertaining hobby and is almost certainly habit-forming. You may easily find yourself crouched

over your machine, red-eyed, in the early hours of the morning thinking that in another five minutes you will solve the problem. Try to break that habit by getting into the fresh air and meeting other Sinclair users.

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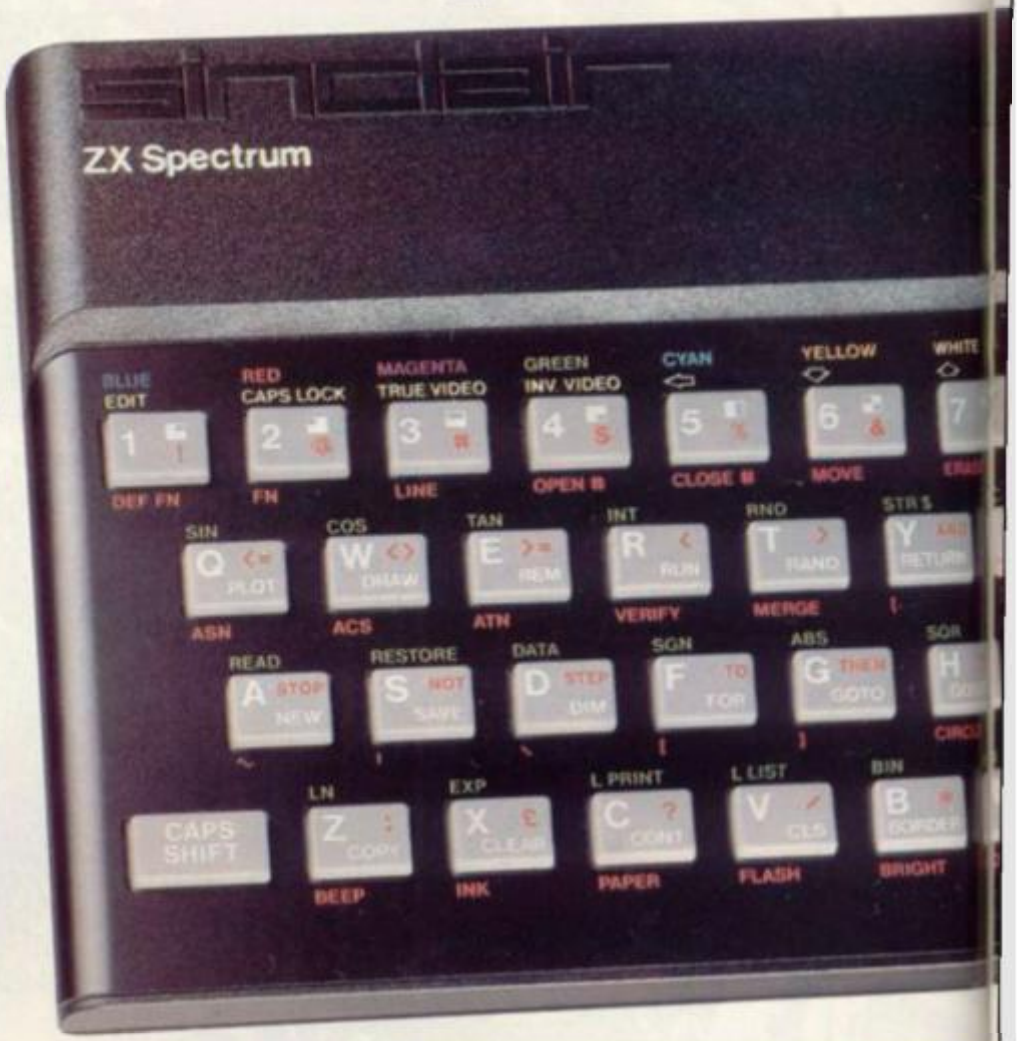

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Simple ways of sorting data

John Gilbert provides the third instalment in his guide to learning programming

DATA STRUCTURING comprises a series of topics which most beginners like to leave alone, unless they are doing O or A level courses in computer science. The reason is that the subject can become complicated. For that reason I have decided to deal with just two areas of a vast subject.

This month I explain how to sort files of data and next month how to search through the sorted data and how best to display it on the television screen or printer.

There is only one data structure in the Basic language and that is the array. An array is a series or table of data items which are grouped under one name. They are indexed using a number. Most professional data processing programs are not written in Basic but in machine code, because of speed restrictions. Also, using data compression techniques in machine code you can enter much more data into the machine than would normally be possible.

Databases written in Basic do not often use arrays as it is better to use long strings of characters into which the data is put, or concatenated, as it is entered. In that way a user does not have to specify the length of a file or how many data items can be entered as a maximum.

Arrays occupy more memory space and their length has to be fixed before data entry but sorting and searching is easier to understand by using one- or two-dimensional arrays, as we can deal with data one element at a time.

The file creation and data entry routines of the database being constructed in this series are shown in figure one.

The listings shown are for the Spectrum but can be used for the ZX-81 with the changes mentioned in the second article. Line 100 of last month's listing has been altered slightly to contain another array, c$. That array will hold the number of the next available space in a file, the maximum number of data items it is possible to store, and the maximum length, in characters, of a data item.

In the file creation routine the user can define the file length and word length but if they are over the

Figure 1

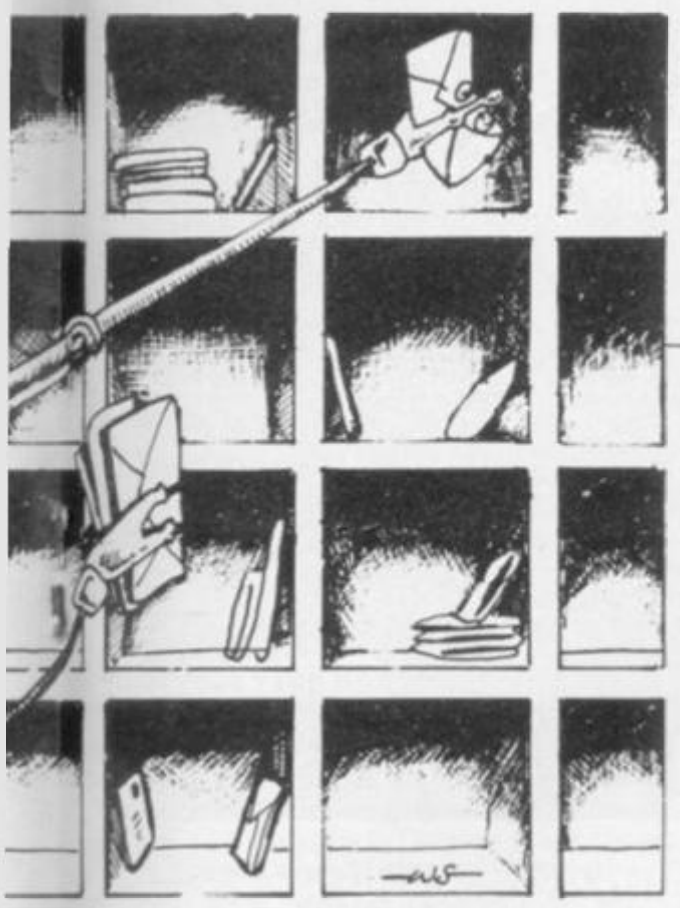
```
  10 REM ADDITIONAL POINTER ARRA
Y 'C'VARIABLE 'p' POINTS TO NEXT
 AVAILABLE   SPACE FOR DATA.
 100 DIM b$(100,20): DIM c(3): L
ET p=1
5000 REM CREATE FILE
6010 CLS : INPUT "HOW MANY DATA
ITEMS IN FILE? ";d$
6020 LET d=VAL d$
6030 CLS : INPUT "WHAT IS THE MA
XIMUM""LENGTH OF EACH ITEM ";e$
: LET e=VAL e$: IF e>20 THEN LET
 e=20
6040 DIM b$(d,e): LET c(2)=d: LE
T c(3)=e
6050 PRINT '''''; INVERSE 1;"NUMB
ER OF ITEMS ";d;''''" LENGTH ",e
;''"OKAY?"
6060 INPUT f$
6070 IF f$(1 TO 1)="n" THEN GO T
O 6000
6080 RETURN
7000 REM DATA ENTRY ROUTINE
7010 IF p>d THEN GO TO 7070
7020 INPUT "ENTER ITEM ";b$: IF
b$=" STOP " THEN RETURN
7030 IF LEN b$>LEN b$(p) THEN GO
 TO 7060
7040 LET b$(p)=b$: LET p=p+1
7050 GO TO 1
7060 PRINT "ENTRY TOO LONG. RE-E
NTER.": GO TO 10
7070 PRINT "CURRENT FILE FULL":
GO TO 1
7080 RETURN
```

Figure 2

```
8000 REM BUBBLE SORT
8010 LET p1=1: LET p2=2: LET sc=
0
8020 IF b$(p1)(1 TO 1)>b$(p2)(1
TO 1) THEN GO SUB 8090
8030 LET p1=p2: LET p2=p2+1
8040 IF sc=0 AND p2>p THEN GO TO
 8120
8050 IF p2>p THEN GO TO 8020
8060 IF sc=0 AND p2>p THEN GO TO
 90
8070 GO TO 8030
8080 LET sc=sc+1
8090 LET h$=b$(p1): LET b$(p1)=b
$(p2): LET b$(p2)=h$
8100 RETURN
8110 CLS : PRINT "SORTED": PAUSE
 200
8120 RETURN
```

Figure 3

```
8000 REM SHELL SORT.
          MODIFICATIONS TO FIGURE
 ONE.
8010 LET p1=1: LET p2=INT (p/2):
 LET sc=0
8030 IF p2>p THEN RETURN
```



maximum bounds, the computer will set them automatically to 100 and 20 respectively. The data entry routine is not yet included on the menu. It is best to put it in the menu routine at line 750 and set it to the Entry Subroutine at line 7000. The menu display at line 1030 will have to be changed so that "ENTER DATA ITEM" is displayed under "CREATE FILE".

When those alterations have been made, the enter routne at line 7000 can be added to the listing.

Figures two and three show program listings for two techniques which can be adapted for use with database. They are two of many. The study of data sorting techniques has interested academics for a long time and some sophisticated algorithms, step-by-step methods of solving problems, have evolved.

Figure two shows the Bubble or Shuttle Sort. It is fairly simple to use but very slow when dealing with large amounts of data. It is called the Bubble Sort because the data is sorted into a list in ascending order with items in the incorrect order 'bubbling' up to the top. The data items are sorted using a keyword, usually the first word of or number in the item. The Bubble Sort will take the first character in an item and compare it to the first character of the next data item.

You may like to change the routine to look at the first three or four letters of a word. The routine can take anything up to three minutes to sort 50 items of data. If you are not concerned with the time element, the routine is easy to program and use.

In the program, line 8010 defines the pointers being used in the routine. Pointer p1 will show the first item on the list and p2 the one beneath it. The variable sc will contain the number of swaps made in one pass. When that is zero at the end of a pass, the sort is concluded.

Line 8020 will send control to the swap routine if the first data item is greater than the second. Line 8030 advances the pointers and line 8040 will return to the menu if the sort is complete. Line 8070 returns control to make another pass of the data.

The swap routine starts at line 8080, and 8090 will swap the data items which are in the incorrect order. Line 8100 returns control to the main sort routine and line 8110 informs the user that the sort is complete. The routine can be improved by adding a line to make the computer display a message, such as 'SORTING', to inform the user a sort is taking place.

The Basic listing in figure two can be used as a base for the other sorting technique known as the Shell Sort and the line numbers which have been modified are shown in figure three.

The Shell Sort, shown in figures three and 4b, is slightly more complex than the Bubble Sort but will run faster with large amounts of data. If a relatively small amount of data, for instance 100 items, is to be used, the Bubble Sort will do the job just as quickly as the Shell Sort.

For the Shell Sort the data file is split approximately into two halves. The pointer p1 is, as with the Bubble Sort, set to the first data item in the file. The pointer p2 is set to the item halfway through the data file.

The item pointed to by p1 is compared to all the items in the second half of the file and swaps are made, as before, if p1 is greater than p2. When p1 has compared item one to all of the last half of the file it will point to the second item and again compare that to the second half of the file.

The sort is finished when either p1 or p2 arrives at the last item of the file and the sc swap counter variable is 0. That shows that no swaps were made in the last pass through the data and the information in the file is in the correct order.

Both structures created by the sort routines from figures two and three are illustrated in figure four. As I have said previously, they are just two of many routines and it is possible to create several other sorts using the two basic structures outlined.

Next month we will encounter a technique of searching data quickly using a Basic routine. I will also explain the best ways in which to display data on the screen, either as individual items or specific lists.

Figure 4

BUBBLE SORT STRUCTURE (BEFORE SORT)

ITEM NUMBER	DATA ELEMENT
1	SINCLAIR
2	MICRODRIVE
3	PRINTER
.	.
.	.
.	.

Figure 4b

SHELL SORT STRUCTURE (BEFORE SORT)

ITEM NUMBER	DATA ELEMENT	
1	USER	FIRST ITEM IN FILE
2	HELPLINE	
3	MODEM	SECOND ITEM IN FILE
.	.	
.	.	
.	.	

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Bob Maunder is co-author of 'The ZX80 Companion' and author of 'The ZX81 Companion'. He is a Senior Lecturer in Computer Science at Teesside Polytechnic, holds an MSc degree in Computer Science, and is a Member of the British Computer Society.

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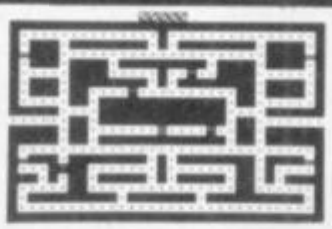

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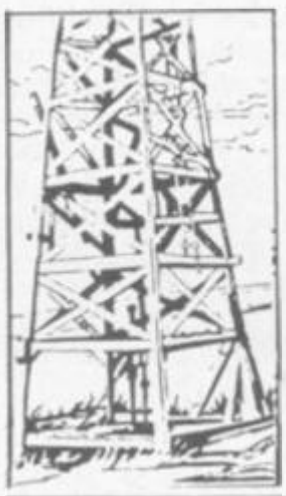

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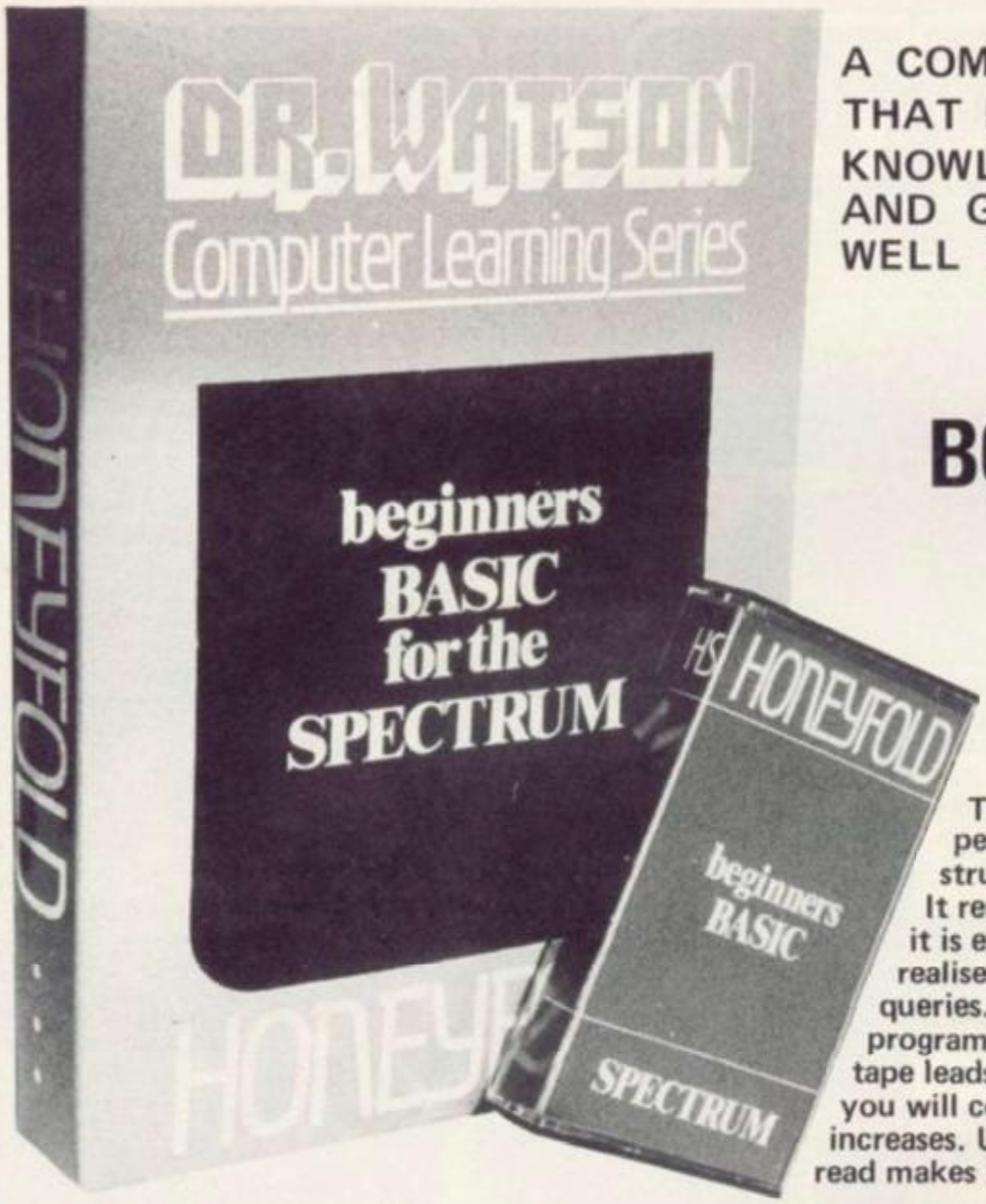

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Eric Deeson considers how the micros in schools scheme is working

Schools fighting for the right to choose

A FEW DAYS ago I received a letter from the head of a primary school — pupil age five to 11 — in the West Country. Knowing my interest in educational computing, he asked if, while claiming to be even-handed, it was right for his local education authority to push only the BBC microcomputer.

He was referring to the scheme by which Government assistance is provided for primary schools to obtain and start to use microcomputers. His concern arises from the fact that his school has been using a micro for months and would prefer the Government to help the purchase of a second of the same kind.

I will bet you are thinking the school uses a Sinclair but the head swears by the Dragon. He does so, while admitting its disadvantages, for good enough reasons. Should he be frustrated in his hopes?

In the case of that school, one's answer is fairly straightforward. It is that the Government, while wishing to support the infant, but very good, British microcomputer industry, cannot be indiscriminate.

In setting-up its scheme to subsidise micros in primary schools, the Department of Industry decided to subsidise purchases of the ZX Spectrum (48K), the BBC micro (Model B), and the Research Machines 480-Z. Perhaps the Dragon would have been on the list if it had arrived a few months earlier; perhaps other, even newer, British machines would have been eligible if they had been available.

Having supported the Government so far, I must now diverge. As I implied in the January issue of *Sinclair User*, teachers are concerned that the Spectrum is not, in practice, having a fair deal. To support that concern there are far more letters than that one on the Dragon. The Dragon man's letter, however, sets out the problem.

I have heard similar complaints from hundreds of primary heads and teachers in the last few months. In almost all instances, they want their schools to have a Spectrum but their authorities are restricting purchases to BBC machines or, in a very few cases, 480-Zs.

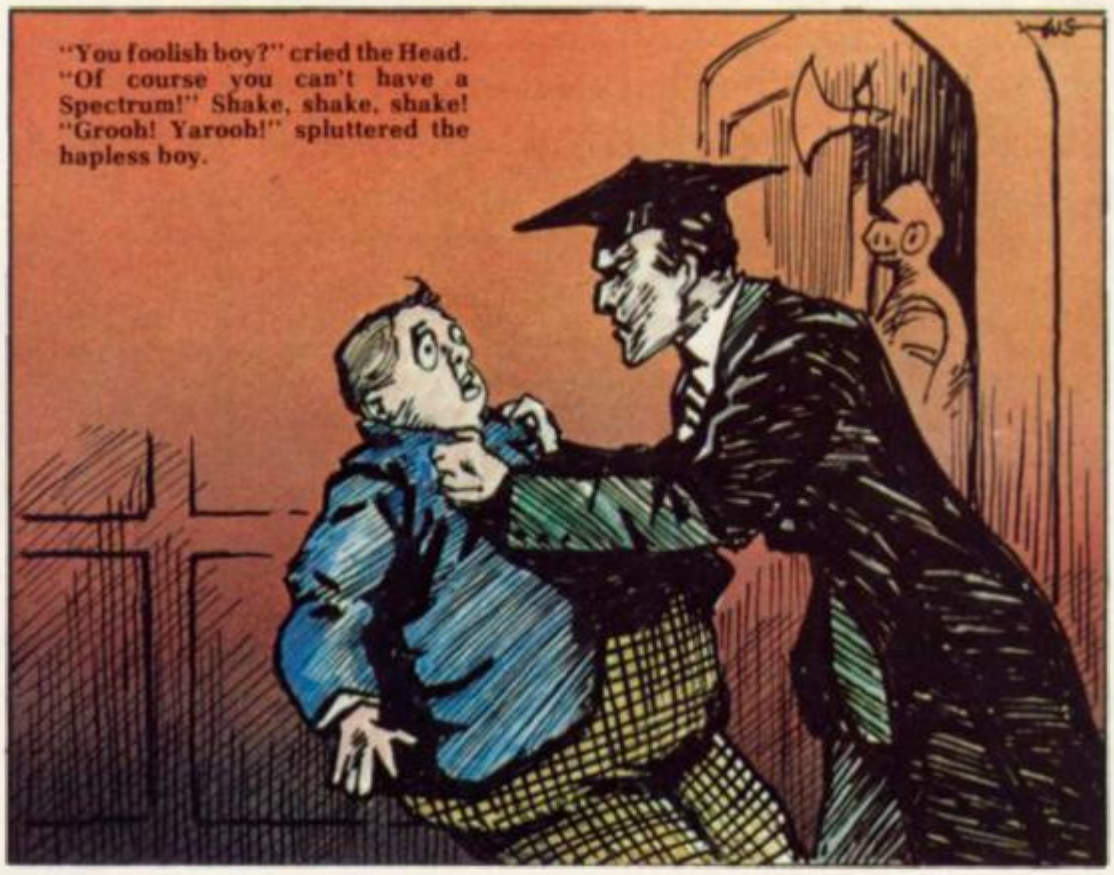
When Mrs Thatcher launched the scheme last July, she said "schools and authorities can choose from three packages of equipment." There is growing concern that too often the authorities are choosing on behalf of the schools, without consulting the schools, and without considering the implications.

If a school wants a Sinclair rather than a 480-Z, or a BBC rather than a Sinclair, why not? I put that point to a spokesman at the Department of Industry. No, it is not the Department of Education and Science which is administering the scheme. He replied that the scheme could not have been run without the local education authorities, principally because it was hoped that they would provide teacher training courses to support the scheme.

If that is a valid reason for restricting choice, then teachers are justified in questioning the ability of local education authorities to do the job.

As a user of Spectrum, BBC and RML machines, I see no reason why a school would prefer either of the latter. That was my second point to the DoI spokesman. He said he believed that all three machines offer a robust and flexible package in a reasonable price range. "Each package has different strengths and weaknesses and was selected to

continued on page 56


"You foolish boy?" cried the Head. "Of course you can't have a Spectrum!" Shake, shake, shake! "Grooh! Yarooh!" spluttered the hapless boy.

continued from page 55

offer schools and local education authorities a reasonable area of choice, to enable them to select the package most appropriate to their particular needs."

He did not answer my point, did he? In what ways are BBC and RML micros better than Spectrum? I have heard of no primary teacher, no primary head teacher, and no computing adviser who does not think the Spectrum package to be best, so why has it been blocked so widely?

As a taxpayer, I am worried that Government money is being spent unnecessarily to support costly equipment which is neither preferred to, nor better than, the cheap equipment available.

"*Aux armes, citoyens*" was the call to the masses in the French Revolution. Being a pacific person, I do not cry for blood in the gutter, but I ask you to consider contacting your local education authority, asking its policy on equipping primary schools under the scheme, and querying that policy if you do not agree with it.

Two years ago a similar scheme was started for secondary school computing. The machines then were the 380-Z — forerunner to the primary school machine — and the then non-existent BBC micro. Two commonly-made comments are worth quoting.

"Most machines ordered under the scheme were 380-Zs, because, at three times the price, the community gets three times the Government subsidy."

"If it were not for the scheme and that bias towards the company, RML would be out of business by now."

You would like a new car for a 17-year-old. The Government will pay half the price of either a new Mini or a new Rover if you pay the rest. Which do you choose? Which should you choose? Would Rovers still be made if they were not such status-worthy company cars?

Alas, what happened at secondary level — unthinking waste of our valuable money — threatens with the primary scheme. What will you do about it?

My campaign is not that primary schools should be compelled to buy Spectrums. It is that they should not be forced to buy any particular one; they should be allowed to choose, as indeed those who set up the scheme probably expected.

I believe that of the three machines in the list, the Spectrum is the one to choose. Here are my reasons. I look forward to someone in the BBC or RML camps to provide meaningful responses.

The Spectrum package is the cheapest. That means that schools wishing to expand a system later will find it less difficult if they start with Spectrums.

The Spectrum is easiest for young children and novice teachers to use. Smallest, lightest package; best with cassette transfer; quickly-learned keyboard for user; single-key keywords plus error-checking for programmer. Look at the BBC and 480-Z manuals if you need proof. Pretend you are new to computing; you will learn little from them.

The Spectrum is the best-developed in the open market. With its huge sales and longest time available, its bugs are few.

The Spectrum is the best-supported by its manufacturer. If you find that difficult to believe after your tussles with Cambridge and Camberley, try to communicate with Acorn or RML.

The Spectrum is the best-supported by other suppliers. The Microscene *Guide to Spectrum Resources*, including supplement, describes hundreds of products from almost 200 sources. It is most unlikely that BBC support will ever approach such a figure and it is certain that there will never be anything like it for the RML machines while, of course, Spectrum back-up grows daily.

The Spectrum package includes a printer. Few primary schools will ever be able to afford a printer to go with the other machines. I could continue, but that is not a bad start to a challenge. I mention disc units, guarantee periods and direction of likely price changes in 1983 but the case should be clear.

One of the main reasons given for having computers in schools is that children can then find what those machines, so important now and in their future, are like. The computers which primary children meet in people's homes, and will meet in their employment, are much closer to the Spectrum than to the other two contestants. No wonder education has such an out-of-touch reputation.

Consider revolting then, at least to the extent of questioning your council. I would like to know what happens. What will happen within the year is that the Spectrum will follow the ZX-81 to become education's most popular machine. Others will languish in cupboards under school stairs.

'Contact your education authority, ask its policy on equipping primary schools, query that policy if you do not agree'

• *Eric Deeson is organiser of the Educational ZX Users' Group, one of whose functions is to develop ZX software for learning at school or at home. Send him two second-class stamps or two international reply coupons for details, including software list, to Highgate School Birmingham 12.*

The 90-page Microscene Guide to Spectrum Resources *mentioned costs £2.50 — overseas £3 — including supplement; if you have read this far, you deserve a special price of 50 pence off from 6 Battenhall Road, Birmingham 17.*

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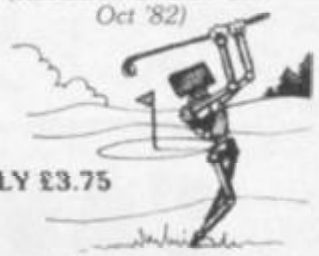

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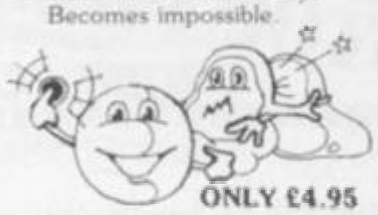

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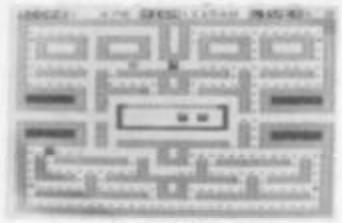

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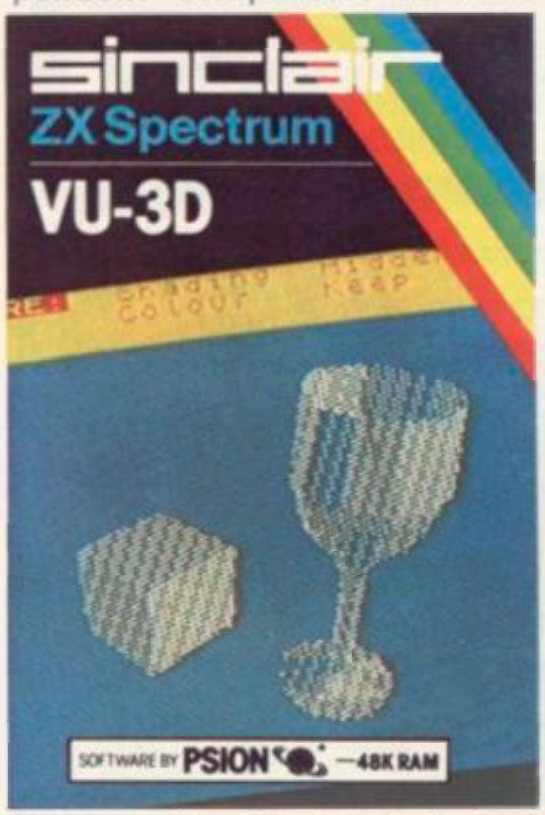
Sinclair acts to improve the standard of its named software

John Gilbert looks at the latest group of cassettes issued by Sinclair and finds that it is now setting the standards

A NEW BATCH of Sinclair Research software for the ZX-81 and Spectrum shows a marked improvement in the quality of programs and a continuation of fine artwork on the cassette inserts.

The reason is that the company is selling programs from other independent companies, such as



Melbourne House and Artic, instead of continuing to rely on Psion, Mikro-Gen and ICL.

The Hobbit takes first place in the new releases for quality and value for money. This adventure game, which the makers claim uses artificial intelligence, is discussed in Mind Games on page 93.

Vu-3D, for the 48K Spectrum, is another good offering from Psion. It allows the user to create a three-dimensional representation of an object on the television screen. The object can then be rotated and viewed from any angle. The objects can be displayed as wirework figures or can be shaded. They can also be magnified and reduced.

It is possible to store the figure on tape in a data file and re-load it to view again. The program costs £9.95 but even though it has some good features it still seems over-priced.

Games feature strongly in the new tapes. Sinclair is selling the Artic range of adventures, A, C and D. Adventure A works on the 16K or 48K Spectrum and 16K ZX-81 and is called **Planet of Death.**

You are stranded on a planet and must return to your spaceship. There is no guide to the keywords but with a little thought you can discover the help command. At times the suggestions can be very unhelpful and it is a good idea to construct a map, as some of the help suggestions may make you retrace your footsteps.

The next adventure so far released is C, called **Ship of Doom.** It can be run on the 48K Spectrum and 16K ZX-81.

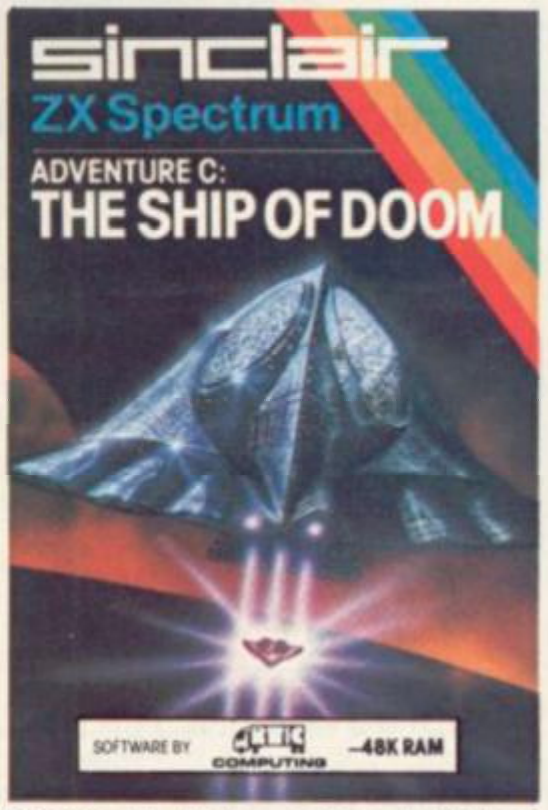
Your ship is captured by aliens who are searching for humanoids to replace their brains with microchips. The object of the game is to escape from the alien craft by breaking the gravitational field. To do so you must find the control room of the alien ship.

The help command is a little more useful in this game and it is easier to get further when first playing the game.

Adventure D, called **Espionage Island**, can be used on the 48K Spectrum or 16K ZX-81. You must escape from an aircraft which is about to crash into the Atlantic. You must then reach the island safely, avoid capture, and try to discover the secret of the island. The game is more difficult than the others and many people have not managed to get out of the aircraft, even though there is a parachute. All the adventures cost £6.95.

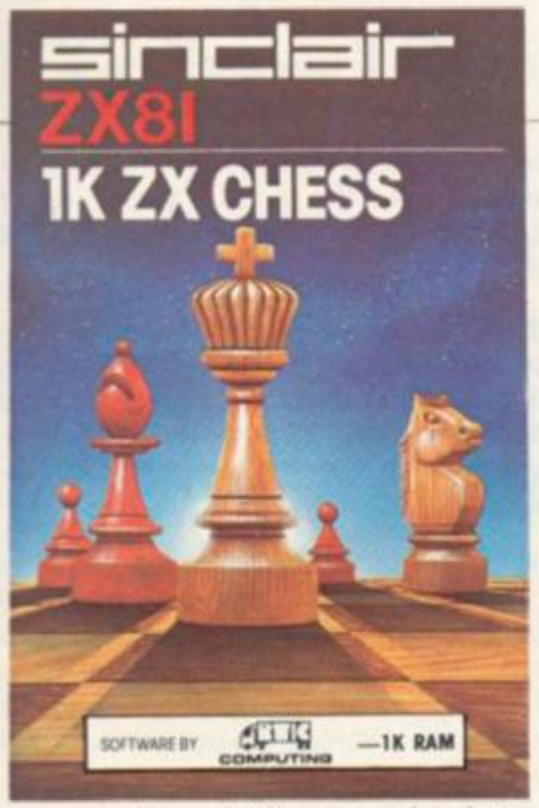
Leaving adventure games, **Reversi,** or **Othello** as it is sometimes called, can be played on the 16K Spectrum or 16K ZX-81. The game has nine levels, from novice to expert, and the computer is difficult to beat. The makers claim that Reversi reflects the strict contemporary morality of Victorian society but we believe that it can be traced to Arabic origins. Reversi costs £7.95.

An interesting addition to the range of software is the Artic **1K**



Chess. It takes some technical wizardry to squeeze this kind of game into the unexpanded ZX-81.

The game can be played using one of two opening moves. Because of the lack of memory, castling, pawn promotion and capturing *en passant*



are not allowed. The game loads in approximately 40 seconds and that is ideal for someone who wants a quick game of chess without having to load from a tape which takes several minutes.

The computer also makes its moves very fast for the amount of memory available to it. 1K Chess costs £4.95.

Super Glooper is an amusing game of Pac-man on the 16K ZX-81. Glooper must paint the maze before the aliens kill him. Unfortunately it is difficult to evade those aliens using the standard ZX-81 keyboard but it is not impossible. Glooper can also pick up one of the shields at the corners of the maze to protect himself and chase the aliens.

On the other side of the tape is **Frogs**, a game of Frogger. You must get the frogs over the river via the moving boats to the jetties on the other bank. If froggie falls into the river, it drowns.

You score points for each frog you get across the river and you can have eight frogs to send to their deaths. Super Glooper and Frogs cost £4.95.

Another game with a familiar-sounding theme is **Through the Wall.** It is based on Breakout and is available for the 16K ZX-81. On the other side of the cassette is **Scramble**, also a familiar theme. Both games on one cassette represent good value at £4.95.

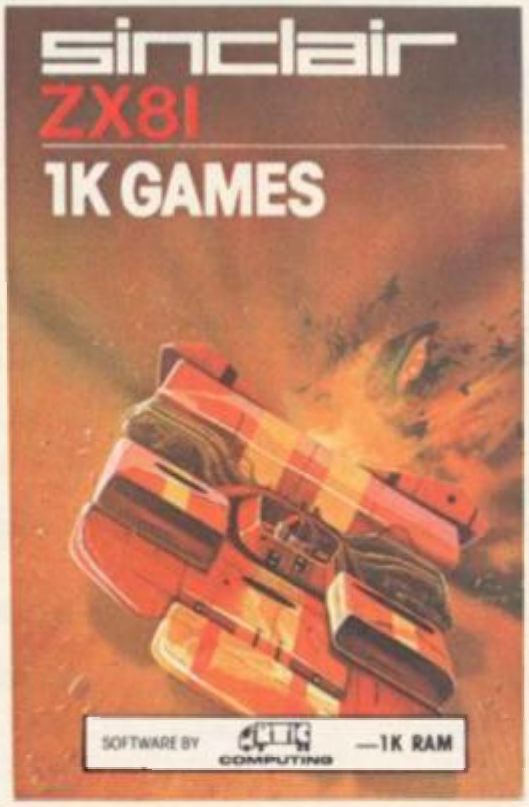
A package for the 1K ZX-81, called **1K Games**, has also been released. The games include **Jackpot,** in which you must try to win the 25 pence jackpot from a one-armed bandit; **Etch and Sketch,** where you can draw pictures on the screen; and **Maze Game**, where you must find your way out of the conventional maze.

The release of this cassette, costing £4.95, is a good idea at a time when so many people are buying ZX-81s.

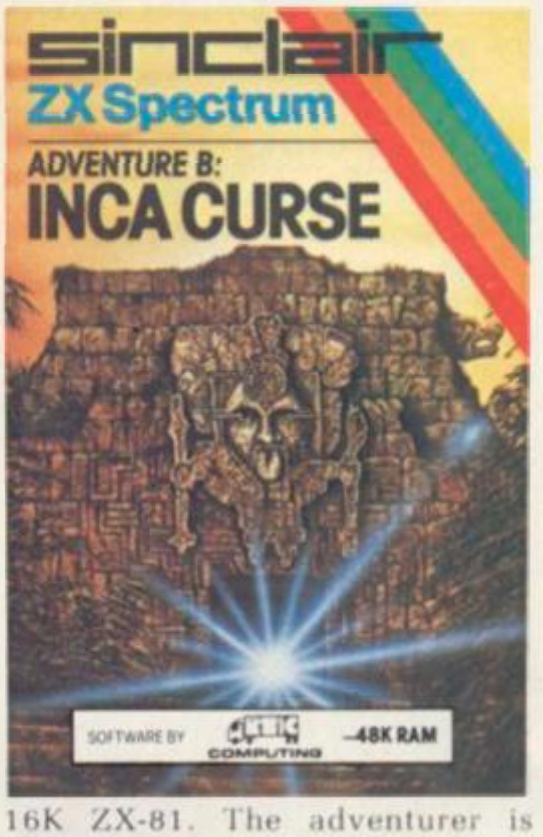
A basic **Toolkit** is available for the 16K ZX-81. It provides a series of machine code routines to make the job of programming easier. It includes a re-number routine, a search and replace routine, a merge routine to put together two separate Basic programs, and a routine to put a Basic program above RAMTOP and out of the way of the NEW command. The Toolkit costs £5.95.

Two database programs are available in the range for the 48K Spectrum. They are called **Collector's Pack** and **Club Record Controller.**

Collector's Pack can be used to store information about coins, stamps or even records. The Club Record Controller will store information about people, such as addresses and telephone numbers. It would be useful to schools or even someone who runs a private club. Both packages are easy to use and cost £9.95.



Adventure B, Inca Curse, for the 48K Spectrum is an upgrade of an adventure which Artic wrote for the



16K ZX-81. The adventurer is exploring in the jungle when he finds an Inca temple. The aim is to go in and drag out all the treasure, or as much as you can carry. It all seems so easy until you enter the game and step into the temple.

The authors have managed to cram a good deal into this adventure and the Artic top score of 3,200 points will take some beating. We must admit that it is not one of the adventures in which we have made much progress. Adventure B costs £6.95.

The latest release of tapes is certainly better than the previous one. The games, utility, and business areas have been covered well but there is still a lack of good educational software. The only tapes available tend to be multi-choice and question-and-answer sessions.

The Psion tapes seem to be the best for quality at the moment and the ones with the most interesting concepts. None of the cassettes reviewed was bad but The Hobbit, Vu-3D, 1K Chess, and Super Glooper seem best.

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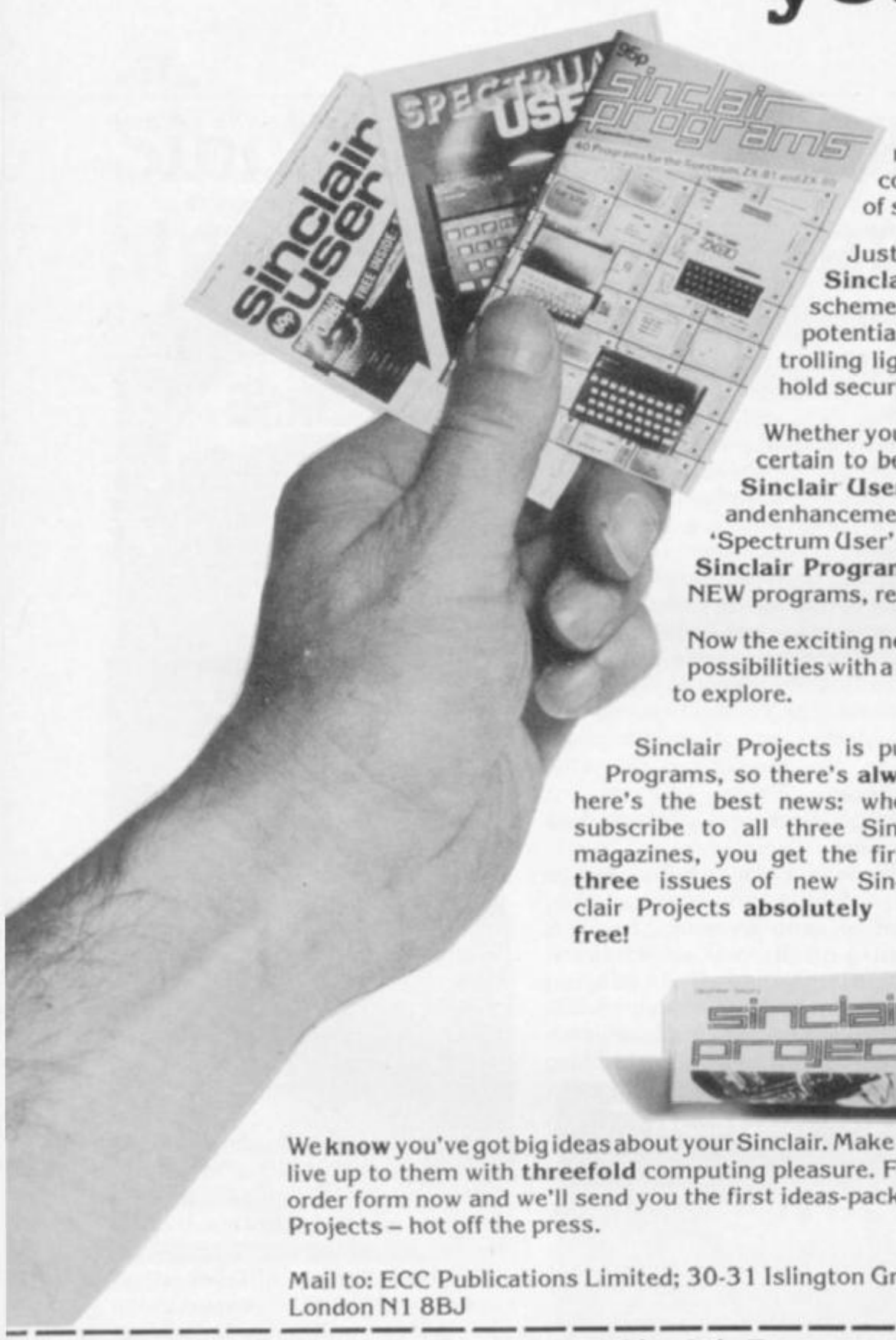

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PROGRAM PRINTOUT

THE OBJECT of **Escape**, for the unexpanded ZX-81, is to lure your enemy, marked by a graphic F, into the hole. You decide where the hole is to be located at the beginning of the game when you are asked for the co-ordinates. Using the cursor keys you must round up this evil fellow and get him to step into the hole.

If he manages to jump on you, you are the one who dies, so be careful when you try to drop him down that hole. The program was sent by Tim Grubb of Linford, Leicestershire.

```
   5 PRINT "HOLE?"
   7 INPUT I
   8 INPUT U
   9 IF I>=21 OR I<10 OR U>=31 O
R U<10 THEN GOTO INT PI
  10 LET A=SIN PI
  20 LET B=A
  30 LET C=CODE "="
  40 LET D=CODE "2"
  50 IF INKEY$="0" THEN LET A=IN
T (RND*INT EXP PI)
  55 PRINT AT I,U;CHR$ 28
  60 IF INKEY$="0" THEN LET B=IN
T (RND*INT EXP PI)
  70 IF INKEY$="5" THEN LET B=B-
SGN PI
  80 IF INKEY$="6" THEN LET A=A+
SGN PI
  90 IF INKEY$="7" THEN LET A=A-
SGN PI
 100 IF INKEY$="8" THEN LET B=B+
SGN PI
 130 IF A>C THEN LET C=C+SGN PI
 140 IF C>A THEN LET C=C-SGN PI
 150 IF B>D THEN LET D=D+SGN PI
 160 IF D>B THEN LET D=D-SGN PI
 170 CLS
 180 PRINT AT A,B;CHR$ 128;AT C,
D;CHR$ 137
 185 IF A=1 AND B=U THEN PRINT "
YOU DUG YOUR OWN GRAVE";
 189 IF I=C AND U=D THEN PRINT "
HES FALLEN";
 190 IF A<>C OR B<>D THEN GOTO C
ODE "M"
 200 PRINT "YOURE DEAD"
```

SELECT is a simple but entertaining game, akin to the Simon game on the market. It is a test of memory, the television set displaying a series of colours which you have to re-create through the keyboard. The colours are accompanied by beeps, just to keep up the interest, and depressing groans accompany your inevitable mistakes.

Submitted by D Frampton of Bridgewater, Somerset. (16K Spectrum).

SELECT

```
 10 LET h$="?"
 15 LET HS=0
 20 GO SUB 600
 30 LET k=10
 40 LET b=1
100 FOR f=1 TO 10
110 LET b=b+1: DIM z(b)
130 FOR g=1 TO b
140 LET z(g)=INT (RND*9)
150 IF z(g)>7 THEN GO TO 140
160 NEXT g
200 FOR h=1 TO b
210 PAPER z(h): BORDER z(h): CL
S
220 BEEP 1,z(h)
230 NEXT h
300 FOR i=1 TO b
310 LET a$=INKEY$
320 IF a$="" THEN GO TO 310
330 IF a$<"0" OR a$>"7" THEN GO
TO 310
340 LET l=(0 AND a$="0")+(1 AND
a$="1")+(2 AND a$="2")+(3 AND a
$="3")+(4 AND a$="4")+(5 AND a$=
"5")+(6 AND a$="6")+(7 AND a$="7
")
345 IF l<>z(i) THEN GO TO 500
350 PAPER l: BORDER l: CLS
360 BEEP 1,l
380 NEXT i
390 NEXT f
400 PAPER 1: BORDER 1: INK 7: C
LS
410 PRINT AT 5,2;"You scored ";
k;" out of 10"
420 IF k=10 THEN PRINT AT 7,7;
FLASH 1;"CONGRATULATIONS"
425 IF k>HS THEN INPUT "You gai
ned a high score,enter   your na
me";h$: LET HS=k
440 PRINT AT 12,4;"High Score="
;HS," by ";h$
470 INPUT "Another game";y$
480 IF y$="y" THEN GO TO 20
490 PRINT AT 15,10;"O.K.Don't":
STOP
500 PAPER 1: INK 7: CLS : FOR n
=1 TO 22: PRINT FLASH 1; BRIGHT
1;"WRONG": NEXT n
505 PLOT 125,85: DRAW 70,40: PL
OT 125,85: DRAW -70,-40: PLOT 12
5,85: DRAW -70,40: PLOT 125,85:
DRAW 70,-40
510 LET k=k-1
520 BEEP 3,-20: BEEP 3,-35
530 PRINT PAPER 1; INK 7;AT 20,
6;"Press any key to continue"
540 PAUSE 0
550 LET b=1
560 GO TO 390
600 PAPER 1: BORDER 1: INK 7: C
LS
610 PRINT AT 0,10;"SEQUENCE";AT
 0,10; OVER 1;"________"
620 PRINT '"The idea of the gam
e is to"
630 PRINT '"follow my sequence
of colours"
640 PRINT '"and beeps by pressi
ng a key,0","to  7, correspondi
ng to  my""sequence of colours
".
650 PRINT "For example"''"if th
e colours are green,red,"''"then
 yellow you would press 4,2,"''"
then 6.";
660 PRINT "When you get a seque
nce"''"correct the next one is l
onger."
670 PRINT AT 20,7;"Press any ke
y"
680 PAUSE 0: CLS
690 PRINT ''"If you get a seque
nce wrong then"
700 PRINT '"the next one will c
onsist of two"''"colours."
710 PRINT '"Your score and the
high score is"''"displayed after
 ten goes."
720 PRINT AT 14,3;"Press any ke
y to start."
730 PAUSE 0: CLS : RETURN
```

IF YOU have difficulty learning or teaching the vocabulary of a foreign language, **Language Tutor** is for you.

At the start of the program a menu is displayed, giving the user a number of options. Initially you will want to enter the word list, so press E. The computer will ask what the language is and how many words you wish to enter.

As the program stands, the words can be up to 10 letters in length but that can be altered by changing the "10" in lines 9052, 9053 and 9125. If the words are longer, the number which can be stored naturally will be reduced.

In the test mode, the student will be asked to translate from the chosen language into English and vice versa. A running score is kept of the student's successes and there is a high score facility.

Michael Coombes of Caerleon, Gwent, who submitted the program, sent a list of 20 German words and their English translations but said that the machine would accept many times that amount of data. Lower-case letters in the listing signify inverse video. (16K ZX-81).

LANGUAGE TUTOR

```
   6 LET HS=0
   7 LET N$=""
  10 PRINT AT 0,0;"LANGUAGE TUTO
R",,"-------- -----"
  15 GOSUB 4000
  20 PRINT AT 6,0;"PLEASE SELECT
:",,,,"PRESS e TO ENTER NEW WORD
 LIST.",,,"PRESS t TO START THE
TEST.",,,"PRESS s TO SAVE THE PR
OGRAM WITHTHE WORD LIST.",,,,"PR
ESS w TO SAVE THE PROGRAM     WI
THOUT THE WORD LIST.",,,"PRESS x
 TO EXIT."
  30 IF INKEY$="E" THEN GOTO 900
0
  40 IF INKEY$="T" THEN GOTO 500
  50 IF INKEY$="S" THEN GOTO 600
0
  60 IF INKEY$="W" THEN GOTO 700
0
  70 IF INKEY$="X" THEN GOTO 800
0
  80 GOTO 30
 500 GOSUB 4000
 505 LET S=0
 510 PRINT AT 5,0;"HOW MANY QUES
TIONS DO YOU WANT?"
 520 INPUT N
 530 PRINT ,,"HERE ARE YOUR QUES
TIONS..."
 540 FOR F=1 TO 100
 550 NEXT F
 560 GOSUB 4000
 570 FOR Q=1 TO N
 580 GOSUB 4040
 590 PRINT AT 4,0;"QUESTION NUMB
ER ";Q;":"
 600 LET A=INT (RND*100)
 610 IF A<50 THEN GOTO 800
 620 GOTO 900
 630 INPUT S$
 632 IF A<50 THEN LET M$=A$(H)(1
 TO M(H))
 634 IF A>49 THEN LET M$=B$(H)(1
 TO N(H))
 640 PRINT AT 12,0;S$
 650 IF S$=M$ THEN LET S=S+1
 660 IF S$=M$ THEN PRINT AT 18,0
;"**WELL DONE, THAT IS CORRECT**"
 670 IF S$<>M$ THEN PRINT AT 15,
0;"NO, THAT IS wrong. THE ANSWER W
AS ";M$
 680 PRINT AT 20,0;"YOUR SCORE S
O FAR IS ";S
 690 FOR F=1 TO 100
 700 NEXT F
 710 NEXT Q
 720 GOTO 1000
 800 LET H=((RND*(W-1)+1))
 805 LET Z$=B$(H)(1 TO N(H))
 810 PRINT ,,,,"WHAT IS THE ENGL
ISH WORD FOR",Z$;"?"
 820 GOTO 630
 900 LET H=((RND*(W-1)+1))
 905 LET Z$=A$(H)(1 TO M(H))
 910 PRINT ,,,,"WHAT IS THE ";X$
;" WORD FOR ",Z$;"?"
 920 GOTO 630
1000 PRINT AT 4,0;"
     "
1010 GOSUB 4000
```

```
1020 PRINT AT 6,0;"YOUR FINAL SC
ORE FOR THIS TEST  IS ";S
1030 IF S>HS THEN GOTO 1500
1035 PRINT ,,,,
1040 IF N$<>"" THEN PRINT "THE T
OP SCORE SO FAR IS ";HS;"."
1050 IF N$<>"" THEN PRINT ,,"THI
S SCORE WAS ACHIEVED",,,"BY ";N$
;"."
1100 PRINT AT 20,0;"PRESS m TO R
ETURN TO THE MENU   PRESS r FOR
A RE-TEST"
1110 IF INKEY$="R" THEN GOTO 500
1120 IF INKEY$="M" THEN GOTO 10
1130 GOTO 1110
1500 PRINT ,,,,"**********
**********"
1510 PRINT ,,,,"WELL DONE.YOU HA
VE BEATEN THE   HIGH SCORE.PLEAS
E ENTER YOUR    NAME..."
1520 PRINT ,,,,"**********
**********"
1530 INPUT N$
1535 LET HS=S
1540 GOTO 1100
4000 LET D=21
4005 FOR F=5 TO D
4010 PRINT AT F,0;"
                  "
4020 NEXT F
4030 RETURN
4040 LET D=18
4050 GOTO 4005
6000 LET J=0
6005 GOSUB 4000
6010 PRINT AT 8,0;"INSERT CASSET
TE AND START","THE CASSETTE PLAY
ER RUNNING",,,,,"PRESS ANY KEY W
HEN YOU ARE READY"
6020 IF INKEY$="" THEN GOTO 6020
6025 IF J=1 THEN CLEAR
6027 CLS
6030 SAVE "LANGUAGE"
6035 GOTO 1
7000 LET J=1
7020 GOTO 6005
8000 GOSUB 4000
8010 PRINT AT 8,0;"TYPE ""CONT""
 TO RESTART THE      PROGRAM."
8020 STOP
8030 GOTO 10
9000 GOSUB 4000
9010 PRINT AT 5,0;"WHAT IS THE F
OREIGN LANGUAGE?"
9020 INPUT X$
9030 PRINT ,,X$
9040 PRINT ,,"HOW MANY WORDS?"
9050 INPUT W
9052 DIM A$(W,10)
9053 DIM B$(W,10)
9055 DIM M(W)
9057 DIM N(W)
9060 PRINT ,,W
9070 PRINT ,,"PLEASE ENTER THE W
ORDS..."
9072 FOR F=1 TO 50
9074 NEXT F
9080 GOSUB 4000
9100 FOR F=1 TO W
9110 PRINT AT 12,0;"
                  ";AT 8,0;"EN
TER ENGLISH WORD"
9120 INPUT E$
9125 IF LEN E$>10 OR E$="" THEN
GOTO 9120
9130 LET M(F)=LEN E$
9140 LET A$(F)=E$
9150 PRINT ,,E$
9150 PRINT ,,E$
9160 PRINT AT 12,0;"ENTER ";X$;"
 WORD"
9170 INPUT E$
9175 IF LEN E$>10 OR E$="" THEN
GOTO 9170
9180 LET N(F)=LEN E$
9190 LET B$(F)=E$
9200 PRINT ,,E$
9210 PRINT AT 10,0;"          ";
AT 14,0;"          "
9220 NEXT F
9230 GOSUB 4000
9240 PRINT AT 5,0;"ALL DATA ENTE
RED.",,,"ARE THERE ANY CORRECTIO
NS? (Y/N)"
9250 IF INKEY$="N" THEN GOTO 928
0
9260 IF INKEY$="Y" THEN GOTO 900
0
9270 GOTO 9250
9280 GOSUB 4000
9290 GOTO 10
```

```
  1 REM "golf"
  3 PAPER 5
  4 BORDER 2
 10 PRINT TAB 13; INK 2;"GOLF©"
 20 LET t=15*(1+RND)
 30 PRINT AT 21,0; INK 4;"
                                "
 40 PRINT AT 21,t-1; INK 5;"■"
 50 INPUT "SWING = ";s
 51 IF s>=85 THEN GO TO 1
 60 PRINT AT 3,0;"SWING = ";s
 70 INPUT "DRIVE= ";d
 80 PRINT "DRIVE= ";d
 90 LET a=d*COS (PI*s/180)
100 LET b=d*SIN (PI*s/180)
110 FOR j=0 TO b/16 STEP .3
115 LET c=.01*(b*j-16*j*j)
120 IF a*j>6200 THEN GO TO 190
130 IF c>40 THEN GO TO 170
140 INK 7
150 PLOT .04*a*j,4*c+8
160 BEEP .005,c+10
170 NEXT j
180 IF ABS (a*b/3200-t)<1 THEN
GO TO 210
190 PRINT AT 10,20;"MISSED!"
200 PAUSE 200
202 CLS
203 GO TO 1
220 PRINT AT 20-j,t-2;"HOLE IN
1": BEEP .3,6-3*j
230 NEXT j
235 PAUSE 200
240 CLS
245 GO TO 1
```

GOLF TWO

IN THE JULY issue we published a version of Golf for the ZX-81. The author of that program. A Baines of Ashton-under-Lyne, Lancashire, has updated that program for the Spectrum. As he says, **Golf Two** is improved by the use of sound and colour.

You are shown a small patch of green and are required to enter first the angle at which you want the ball to travel on its trajectory and, second, the strength with which you want to hit it. The last figure usually is in the range 350 to 490. (16K Spectrum).

IF YOU have an unfulfilled craving for power, **Ruler** will provide a painless way of getting it. At the start of the game, you have 200 lb. of seed corn and 100 people. You must divide the corn so that you have sufficient to feed to population and plenty left to sow for the following year.

If you calculations are correct, the amount of food and of people will increase. When they have both passed the 1,000 mark, the screen will display God save the King and the game is over.

Since the program runs in 1K of RAM it naturally cannot have many frills. The only randomising factor is the prospect of storms ruining the crops. With more RAM or with a memory-saving purge, you should be able to add a few extras.

Ruler was sent by A Greenhalgh of Darwen, Lancashire, for the unexpanded ZX-81.

```
 10 LET P=100
 20 LET F=200
 30 LET X=INT (RND*5)
 40 PRINT F;"LBS OF FOOD: ";P;"
PEOPLE"
 60 PRINT "INPUT FOOD FOR SOWIN
G"
 70 INPUT S
 80 PRINT "FOR YOUR PEOPLE"
 90 INPUT T
 91 IF S+T>F THEN GOTO 60
 95 LET Z=F-(S+T)
110 LET P=INT (F/P)*(P/2)+F
120 IF P<10 THEN PRINT "YOUR PE
OPLE HAVE LEFT YOU";W
140 IF X=3 THEN GOSUB 200
141 LET F=INT (Z+(S*3.5))
142 IF P>1000 AND F>1000 THEN P
RINT "GOD SAVE THE KING";W
145 PAUSE 250
146 CLS
150 GOTO 40
200 PRINT "STORMS HAVE RUINED Y
OUR CROPS"
210 LET S=0
220 RETURN
```

MINOTAUR

MINOTAUR is an excellent maze game for the expanded ZX-81. The display is a random-generated maze with yourself as an "O". Your task is to reach the exit at bottom right by using the four cursor keys. Your main problem is to avoid the hungry Minotaur which is able to home-in on your position.

We were impressed by the intelligence shown by the beast, which is able to check its position against yours, without slowing the program. The routine used would obviously be useful in composing a Pacman-style program.

Occasionally the random maze proves to be blocked, so a quick visual check is a good idea. Sent by Kevin Tutte of Sutton Cold field, West Midlands.

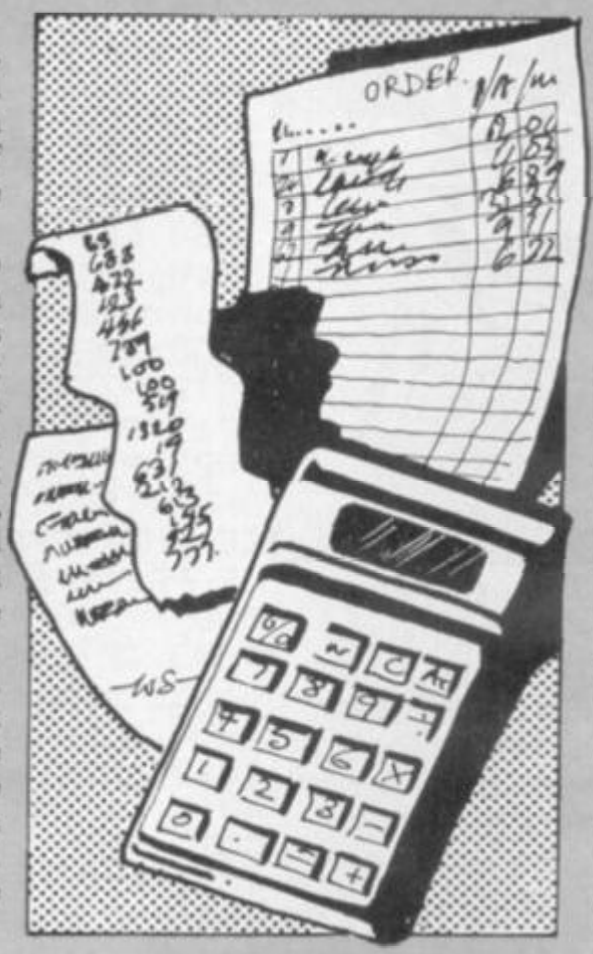
```
  20 FAST
  30 DIM M$(21,31)
  40 FOR M=1 TO 19 STEP 2
  50 LET M$(M)="(thirty one inve
rse SPACEs)"
  60 FOR N=1 TO 3
  70 LET M$(M,INT (RND*28)+2)="
"
  80 NEXT N
  90 LET M$(M+1,1)=" "
 100 LET M$(M+1,31)=" "
 110 NEXT M
 120 LET M$(1)="(thirty one inve
rse SPACEs)"
 130 LET M$(21)=M$(1)
 140 FOR M=4 TO 18
 150 LET R=INT (RND*28)+2
 160 IF M$(M-1,R)<>" " AND M$(M+
1,R)<>" " THEN LET M$(M,R)="(inv
erse SPACE)"
 170 NEXT M
 180 LET M$(20,30)="(graphic A)"
 200 LET X=2
 210 LET Y=2
 220 LET CX=2
 230 LET CY=20
 240 LET D=-1
 400 FOR N=1 TO 21
 410 PRINT AT N,1;M$(N)
 420 NEXT N
 430 SLOW
 500 PRINT AT Y,X;" "
 510 LET X=X+(INKEY$="8" AND M$(
Y,X+1)<>"(inverse SPACE)")-(INKE
Y$="5" AND M$(Y,X-1)<>"(inverse
SPACE)")
 520 LET Y=Y+(INKEY$="6" AND M$(
Y+1,X)<>"(inverse SPACE)")-(INKE
Y$="7" AND M$(Y-1,X)<>"(inverse
SPACE)")
 530 PRINT AT Y,X;"O"
 540 IF X=30 AND Y=20 THEN GOTO
600
 550 PRINT AT CY,CX;" "
 560 GOSUB (1000*(1+(CY=Y)+2*(M$
(CY+1,CX)<>"(inverse SPACE)" AND
 (Y>CY))+3*(M$(CY-1,CX)<>"(inver
se SPACE)" AND (Y<CY))))
 570 PRINT AT CY,CX;"(inverse QU
OTATION MARK)"
 580 GOTO 500
 600 PRINT AT 0,1;"WELL DONE YOU
 ESCAPED";
 610 STOP
 700 PRINT AT 0,1;"BAD LUCK YOU
HAVE BEEN EATEN"
 710 STOP
1000 IF M$(CY,CX+D)="(inverse SP
ACE)" THEN LET D=-D
1020 LET CX=CX+D
1030 RETURN
2000 LET D=(CX<X)-(CX>X)
2010 IF CX=X THEN GOTO 700
2020 IF M$(CY,(CX-1) TO (CX+1))=
"(inverse SPACE;SPACE;inverse SP
ACE)" THEN LET D=0
2030 GOTO 1000
3000 LET CY=CY+1
3010 IF CX<>X THEN LET D=(CX<X)-
(CX>X)
3020 RETURN
4000 LET CY=CY-1
4010 IF CX<>X THEN LET D=(CX<X)-
(CX>X)
4020 RETURN
```

ZX ACCOUNTS

NEW RHODES of Braintree, Essex is a studying A level accounts. He has written a program which he feels will be of help to anyone following the same course.

The routine allows the user to input a trial balance and will then draw up a trading account — things like stock and gross profit, a profit and loss account showing all expenses with nett profit, and a balance sheet showing current assets, depreciation of fixed assets, current and fixed liabilities, as well as the final balance sheets on both sides. All three of those accounts are available under menu control.

Rhodes claims the following novel features for his listing: First, that option six allows the user to change the value of any account and see the effect on the three amounts. As soon as any single account is changed, all the accounts which are affected are updated with the new balance.

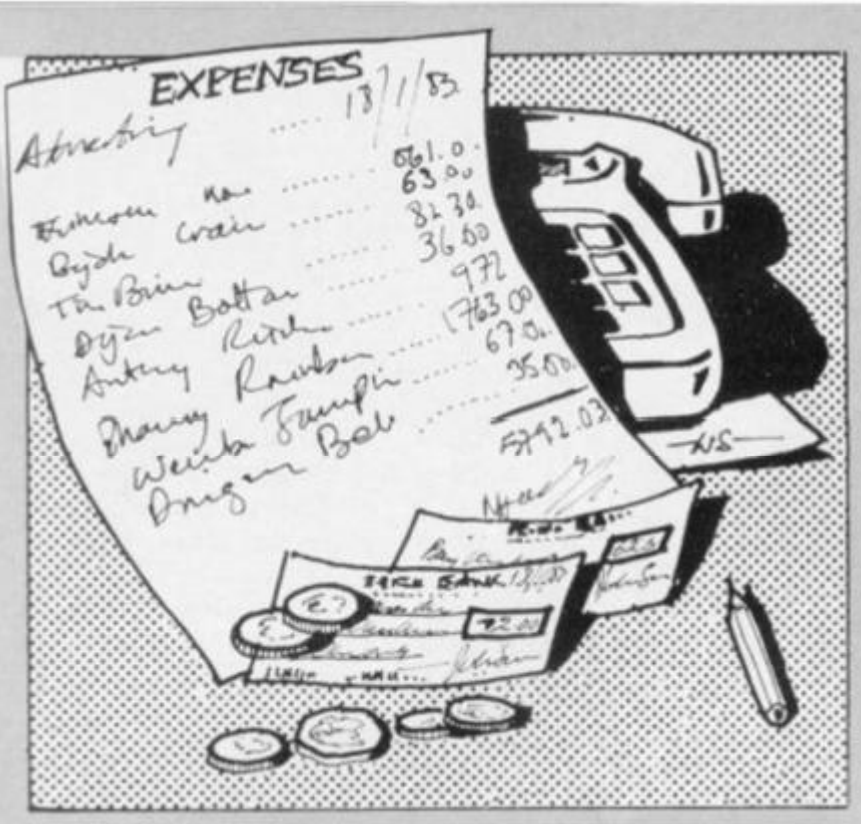


Second, that a summary gross profit, nett profit, total expenses and new capital are given after each alteration and that incorporates a routine which displays a message if the effect of the alterations will cause the balance sheet not to balance.

Users must remember never to enter RUN, or all the variables will be lost, and that when one value is changed it will usually be necessary to alter another account value. For example, if the value of sales is increased, the user must increase the value of either the cash or bank account, so that everthing balances. It is also essential that accounts to be altered must be entered as the abbreviations shown between lines 201 and 234.

Lower-case letters in our listing signify inverse video, unless they appear inside brackets, where they give graphics intructions (16K ZX-81).

```
  0~REM ZX81 ACCOUNTS SYSTEM
  1 REM M W RHODES NOV  1982
 10 GOTO 100
 20 CLS
 30 PRINT AT 10,9;"FILE NAME?"
 40 INPUT N$
 50 PRINT AT 12,8;"PRESS NEWLIN
    E"
 55 IF N$="" THEN PRINT AT 14,6
;"INVALID FILE NAME"
 60 INPUT I$
 65 IF N$="" THEN GOTO 20
 70 CLS
 80 SAVE N$
190 GOTO 500
199 REM vocabulary
200 DIM A$(34,10)
201 LET A$(1)="OP STOCK"
202 LET A$(2)="PURCHASES"
203 LET A$(3)="RET OUT"
204 LET A$(4)="CARR IN"
205 LET A$(5)="CL STOCK"
206~LET A$(6)="SALES"
207 LET A$(7)="RET IN"
208 LET A$(8)="DISC ALL"
209 LET A$(9)="BAD DEBTS"
210 LET A$(10)="PROV "" """
211 LET A$(11)="WAGES"
212 LET A$(12)="INSURANCE"
213 LET A$(13)="PROV DEP"
214 LET A$(14)="ADV EXP"
215 LET A$(15)="SALES COM"
216 LET A$(16)="RENT"
217 LET A$(17)="LIGHT/HT"
218 LET A$(18)="LOAN INT"
219 LET A$(19)="GEN EXP"
220 LET A$(20)="TOTAL P/P"
221 LET A$(21)="TOTAL OWE"
222 LET A$(22)="DISC REC"
223 LET A$(23)="RENT REC"
224 LET A$(24)="DIVI REC"
225 LET A$(25)="INTR REC"
226 LET A$(26)="CAPITAL"
227 LET A$(27)="DRAWINGS"
228~LET A$(28)="LOANS"
229 LET A$(29)="CREDITORS"
230 LET A$(30)="OVERDRAFT"
231 LET A$(31)="F ASSETS"
232 LET A$(32)="DEBTORS"
233 LET A$(33)="CASH-BANK"
234 LET A$(34)="CASH-HAND"
235 REM end vocabulary
240 RETURN
500 REM  menu
505 CLS
510 PRINT AT 0,0;"zx accounts s
ystem"
515 PRINT AT 5,0;"OPTIONS:"
520 PRINT ,,"(1) SET UP NEW DAT
A",,,"(2) PRINT CURRENT DATA",,,
"(3) TRADING A/C",,,,"(4) PROFIT
 AND LOSS A/C",,,"(5) BALANCE SH
EET",,,"(6) CHANGE A SINGLE ITEM
",,,"(7) CALCULATE DEPRECIATION"
```




```
,,,"(8) SAVE PROGRAM AND DATA"
 530 INPUT J
 535 CLS
 540 IF J<1 OR J>8 THEN GOTO 600
 550 IF J=1 THEN GOTO 1000
 555 IF J=2 THEN GOTO 4500
 560 IF J=3 THEN GOTO 5000
 570 IF J=4 THEN GOTO 5500
 575 IF J=5 THEN GOTO 6000
 580 IF J=6 THEN GOTO 3000
 585 IF J=7 THEN GOTO 7000
 590 IF J=8 THEN GOTO 20
 595 GOTO 500
 600 CLS
 610 PRINT AT 10,5;"ERROR INVALI
D INPUT"
 620 FOR N=1 TO 70
 630 NEXT N
 640 CLS
 650 GOTO 500
1000 REM read in trial balance
1005 GOSUB 200
1010 DIM A(34)
1020 FOR N=1 TO 34
1030 PRINT A$(N);"£";
1040 INPUT A(N)
1050 PRINT A(N)
1055 IF N=18 THEN GOSUB 9500
1060 NEXT N
1070 GOSUB 9500
3000 REM calculations
3005 CLS
3010 LET TOT1=(A(1)+A(2)-A(3)+A(
4))
3020 LET TOT2=TOT1-A(5)
3030 LET TOT3=A(6)-A(7)
3040 LET GP=TOT3-TOT2
3050 LET TOT4=GP+TOT2
3060 LET TOT5=TOT3
3070 LET TOTEXP=A(8)+A(9)+A(10)+
A(11)+A(12)+A(13)+A(14)+A(15)+A(
16)+A(17)+A(18)+A(19)-A(20)+A(21
)
3080 LET TOT6=(GP+A(22)+A(23)+A(
24)+A(25))
3090 LET NETP=TOT6-TOTEXP
3100 LET TOT7=TOTEXP+NETP
3200 LET TOT8=A(31)-A(13)
3210 LET TOT9=A(5)+A(32)-A(10)+A
(20)+A(33)+A(34)
3220 LET TOT10=A(26)+NETP
3230 LET TOT11=TOT10-A(27)+A(28)
3240 LET TOT12=A(29)+A(21)+A(30)
3250 LET LHS=TOT11+TOT12
3260 LET RHS=TOT9+TOT8
3310 PRINT AT 0,4;" summary of d
ocuments ",,,,,"GROSS PROFIT","£
";GP;TAB 0;"TOTAL EXPENSES","£";
TOTEXP;TAB 0;"NET PROFIT","£";NE
TP;TAB 0;"NEW CAPITAL","£";TOT11
4000 PRINT ,,"ENTER THE NAME OF
ANY ITEM YOU  WISH TO ALTER TO S
EE THE EFFECT ON THE PROFIT ETC
OR PRESS N/L  TO RETURN TO THE M
ENU"
4003 IF LHS<>RHS THEN PRINT " ba
lance sheet does not balance-"
4005 DIM C$(1,10)
4010 INPUT C$(1)
4015 IF C$(1)="          " THEN
GOTO 500
4020 FOR L=1 TO 34
4030 IF C$(1)=A$(L) THEN GOTO 41
00
4040 NEXT L
4050 PRINT ,,C$(1);" NOT FOUND"
4060 GOTO 4005
4100 PRINT ,,C$(1),,,,"NEW AMOUN
T?"
4110 INPUT A(L)
4130 GOTO 3000
4500 REM  current data
4505 CLS
4510 FOR X=1 TO 34
4520 PRINT A$(X);"£";A(X)
4530 IF X=19 THEN GOTO 4550
4540 NEXT X
4542 PRINT AT 21,0;"    Press ne
wline for menu      "
4545 INPUT P$
4547 GOTO 500
4550 PRINT AT 21,0;"    Press ne
wline to continue   "
4560 INPUT P$
4570 CLS
4580 GOTO 4540
5000 REM  trading a\c
5010 PRINT AT 0,6;" trading acco
unt "
5020 PRINT ,,,,
5030 FOR X=1 TO 4
5035 PRINT TAB 0;A$(X);A(X)
5040 NEXT X
5045 PRINT TAB 10;"(five graphic
 7s)";TAB 10;TOT1
5050 PRINT TAB 0;A$(5);A(5)
```

```
5055 PRINT TAB 10;"(five graphic
 7s)";TAB 10;TOT2
5060 PRINT TAB 0;"GROSS PFT";TAB
 10;GP;TAB 10;"(five graphic 6s)
";TAB 10;TOT4;TAB 10;"(five grap
hic 7s)"
5070 PRINT AT 3,16;A$(6);A(6);TA
B 16;A$(7);A(7);TAB 26;"(five gr
aphic 7s)";TAB 26;TOT3
5080 PRINT AT 13,26;"(five graph
ic 6s)";TAB 26;TOT5;TAB 26;"(fiv
e graphic 7s)"
5090 PRINT AT 18,0;"Press any ke
y for menu"
5100 IF INKEY$="" THEN GOTO 5100
5110 GOTO 500
5500 REM  profit and loss
5510 PRINT AT 0,3;" profit and l
oss account "
5520 PRINT ,,,,,,
5530 FOR X=8 TO 21
5540 PRINT A$(X);A(X)
5550 NEXT X
5560 PRINT TAB 0;"NET PROF";TAB
10;NETP;TAB 10;"(five graphic 6s
)";TAB 10;TOT7;TAB 10;"(five gra
phic 7s)"
5570 PRINT AT 4,17;"GROSS PR";TA
B 27;GP
5580 FOR X=22 TO 25
5590 PRINT TAB 17;A$(X);A(X)
5600 NEXT X
5610 PRINT AT 19,27;"(five graph
ic 6s)";TAB 27;TOT6;TAB 27;"(fiv
e graphic 7s)"
5620 IF INKEY$="" THEN GOTO 5620
5630 GOTO 500
6000 REM  balance sheet
6010 PRINT AT 0,7;" balance shee
t "
6020 PRINT ,,,,,,
6030 PRINT A$(26);A(26);TAB 0;"N
ET PROF";TAB 10;NETP;TAB 10;"(fi
ve graphic 7s)";TAB 10;TOT10
6040 PRINT TAB 0;A$(27);A(27);TA
B 10;"(five graphic 6s)";TAB 10;
TOT11;TAB 0;A$(28);A(28)
6050 PRINT ,,
6060 PRINT A$(29);A(29);TAB 0;A$
(21);A(21);TAB 0;A$(30);A(30);TA
B 10;"(five graphic 6s)";TAB 10;
TOT12
6070 PRINT ,,TAB 10;"(five graph
ic 6s)";TAB 10;LHS;TAB 10;"(five
 graphic 7s)"
6080 PRINT AT 4,17;A$(31);A(31);
TAB 17;A$(13);A(13);TAB 27;"(fiv
e 7s)";TAB 27;TOT 8
6090 PRINT
6100 PRINT TAB 17;A$(5);A(5);TAB
 17;A$(32);A(32);TAB 17;A$(9);A(
9);TAB 17;A$(10);A(10);TAB 17;A$
(20);A(20);TAB 17;A$(33);A(33);T
AB 17;A$(34);A(34)
6110 PRINT TAB 27;"(five graphic
 6s)";TAB 27;TOT9
6120 PRINT ,,TAB 27;"(five graph
ic 6s)";TAB 27;RHS;TAB 27;"(five
 graphic 7s)"
6130 IF INKEY$="" THEN GOTO 6130
6140 GOTO 500
7000 REM depreciation
7010 CLS
7015 PRINT TAB 1;" calculation o
f depreciation "
7020 PRINT AT 6,0;"ENTER THE FOL
LOWING INFORMATION REGARDING YOU
R REQUIREMENTS FOR DEPRECIATION
OF FIXED ASSETS ANDTHE AMOUNT TO
 CHARGE EACH YEAR  WILL BE DISPL
AYED BY STRAIGHT  LINE METHOD O
F CALCULATION"
7030 PRINT ,,"VALUE OF ASSET?",
7040 INPUT VAL
7050 PRINT "£";VAL
7060 PRINT "NO OF YEARS?",
7070 INPUT N
7080 PRINT N
7090 PRINT "EXPECTED VALUE AFTER
 ";N;" YEARS"
7100 INPUT V2
7105 PRINT
7110 PRINT "£";V2
7120 LET DEP=(VAL-V2)/N
7130 PRINT ,,"CHARGE £";INT (DEP
*100)/100;" EACH YEAR"
7140 PRINT AT 21,0;"     Press n
ewline for menu      "
7150 INPUT P$
7160 GOTO 500
9500 PRINT AT 21,2;" enter y if
this is correct "
9510 INPUT R$
9520 IF R$<>"Y" THEN RUN
9530 CLS
9540 RETURN
```

SPECTRUM LASER

```
   1 PRINT INK 0;AT 11,2;"      L
ASER @ R. Hartley.": PAUSE 300:
CLS
   2 PRINT "TEN ALIEN SPACE FIGH
TERS ARMED   WITH THE LATEST WEA
PONS SEEN   APPROACHING  YOUR
 TWIN LASER TURRET. YOU MUST DES
TROY ALL TEN TO SURVIVE. FIGHTER
S WILL FIRE 15 SECONDS AFTER SIG
HTING."
   3 PRINT "INSTRUCTIONS:"
   4 PRINT "PRESS:"
   5 PRINT INK 1;"5  TO MOVE LAS
ER RIGHT"
   6 PRINT INK 1;"6  TO ELEVATE
LASER"
   7 PRINT INK 1;"7  TO LOWER LA
SER"
   8 PRINT INK 1;"8  TO MOVE LAS
ER LEFT"
   9 PRINT INK 3;"0  TO FIRE LAS
ER"
  10 PRINT INK 4;AT 16,5;"PRESS
ANY KEY TO START"
  11 IF INKEY$="" THEN GO TO 11
  12 IF INKEY$<>"" THEN GO TO 13
  14 GO SUB 8000
  15 INK 2: PAPER 0: BORDER 1: C
LS
  20 PRINT "████████████████████
████████████"
  30 FOR n=0 TO 18: PRINT AT n,0
;"█";AT n,31;"█": NEXT n
  35 FOR n=0 TO 31
  40 PRINT AT 19,n;"█";AT 20,n;"
█";AT 21,n;"█"
  50 NEXT n
  60 PRINT FLASH 1; INK 6;AT 19,
0;"█";AT 19,31;"█"
  70 PRINT INK 7; PAPER 0;AT 20,
14;"ALIENS HIT"
  80 PRINT FLASH 1; INK 4;AT 20,
11;"█"
  81 PRINT FLASH 1; INK 7;AT 20,
5;"ALERT"
 590 LET rf=0: LET c=0: LET sc=0
 600 REM target
 605 LET a$=" ⊛ ": LET c$="[-■-]"
 610 LET d=14: LET a=22
 620 LET r1=INT (RND+.5): IF r1=
0 AND d>4 THEN LET d=d-1: IF r1=
1 AND d<17 THEN LET d=d+1
 630 LET r2=INT (RND+.5): IF r2=
0 AND a>2 THEN LET a=a-1: IF r2=
1 AND a<16 THEN LET a=a+1
 641 IF INKEY$="5" AND a<17 THEN
 LET a=a+3
 642 IF INKEY$="6" AND d>3 THEN
LET d=d-3
 643 IF INKEY$="7" AND d<16 THEN
 LET d=d+3
 644 IF INKEY$="8" AND a>2 THEN
LET a=a-3
 649 LET c=c+1: IF c>=20 THEN GO
 TO 652: IF c>=10 THEN GO TO 651
:
 650 PRINT AT d,a;a$: GO TO 654
 651 PRINT AT d,a;b$: GO TO 655
 652 PRINT AT d,a;c$
 655 IF INKEY$="0" THEN GO TO 60
00
 700 BEEP .5,10
```

RD HARTLEY of Southend-on-Sea, Essex, has owned a Spectrum for only two months, yet he has already produced a publishable program.

You are in the gun turret of a Federation starship. A squadron of enemy fighters is seen approaching. Your task is to blast them before you come within range of their guns.

Full instructions are given with the game, but you will find it extremely difficult to manoeuvre the enemy to the focus point of your twin laser guns and see the resulting explosion.

Graphics notes:

605 — Graphic A, graphic T, graphic I and graphic E.

7000 — Graphic R.

```
  800 LET rf=rf+1
  810 IF rf<30 THEN GO TO 900
  820 FOR x=6 TO 0 STEP -6
  830 PLOT a*8+10,175-d*8: DRAW I
NK x;40,-36
  840 NEXT x
  850 BORDER 2: PAPER 2: CLS
  860 PRINT INK 6;AT 8,6;"LASER D
ESTROYED": PAUSE 300: PAPER 7: C
LS : RUN
  900 PRINT AT d,a;"   "
1000 GO TO 620
5000 REM firing lazer
5000 REM shoot
6105 FOR n=6 TO 0 STEP -6
6110 PLOT 7,24: DRAW INK n;125,6
9
6120 PLOT 248,24: DRAW INK n;-11
6,68
6125 NEXT n
6127 BEEP .5,60
6130 IF a=15 AND d=10 THEN GO TO
  6134
6133 GO TO 656
6134 GO SUB 7000
6135 LET sc=sc+1: PRINT AT 20,25
;sc: LET rf=0:
6136 IF sc>=10 THEN GO TO 9500
6137 LET c=0
6140 GO TO 600
7000 LET z$=":":
7010 FOR n=6 TO 0 STEP -6
7015 PRINT INK n;AT 10,15;z$
7020 FOR p=1 TO 4
7025 BEEP .05,p*10
7030 PRINT INK n;AT 10+p,15+p;z$
;AT 10-p,15-p;z$;AT 10+p,15-p;z$
;AT 10-p,15+p;z$;AT 10,15+p;z$;A
T 10,15-p;z$;AT 10+p,15;z$;AT 10
-p,15;z$
7040 NEXT p: NEXT n
7045 RETURN
8000 FOR a=0 TO 7: READ d: POKE
USR "A"+a,d: NEXT a
8500 DATA BIN 0,BIN 01000010,BIN
  10011001,BIN 11111111,BIN 10011
001,BIN 01000010,BIN 0,BIN 0
8510 FOR a=0 TO 7: READ d: POKE
USR "T"+a,d: NEXT a
8520 FOR a=0 TO 7: READ d: POKE
USR "I"+a,d: NEXT a
8530 FOR a=0 TO 7: READ d: POKE
USR "E"+a,d: NEXT a
8600 DATA BIN 11100000,BIN 11000
000,BIN 11000000,BIN 11111111,BI
N 11111111,BIN 11000000,BIN 1100
0000,BIN 11100000
8605 DATA BIN 0,BIN 01111110,BIN
  01111110,BIN 11111111,BIN 11111
111,BIN 01111110,BIN 01111110,0
8610 DATA BIN 00000111,BIN 00000
011,BIN 00000011,BIN 11111111,BI
N 11111111,BIN 00000011,BIN 0000
0011,BIN 00000111
8650 FOR a=0 TO 7: READ d: POKE
USR "R"+a,d: NEXT a
8655 DATA BIN 01000000,0,BIN 011
00010,BIN 00100001,0,BIN 0001100
0,1,BIN 10000101
8999 RETURN
9000 STOP
9500 PRINT AT 9,5;"ALIENS DESTRO
YED"
```

STUNT RIDER

STUNT RIDER is a games program for the 16K Spectrum in which you are invited to risk life and paintwork by leaping your motorcycle over a row of buses.

You will start with eight buses and each successful leap will increase the number by one to the maximum number you have chosen. Pressing P makes the motorcycle accelerate and Q will slow it down. Your speed has to be correct to enable you to jump the buses without crashing.

If all the buses are jumped up to the number chosen by the user, he will be congratulated by an appropriate tune and his score given. There is also a timer. Enter RUN 9000 and then RUN.

Stunt Rider was sent by J Mayers of London N20. Graphics notes: 50 — Graphic Ds; graphic C. 60 — Graphic A, graphic B. 120 — Graphic E. 550 — Graphic A, graphic B — both entered in inverse video — 620 — Symbol Shift 2.

```
  2 GO SUB 5000
  3 LET high=0
  4 LET htime=1000
  5 POKE 23693,56: BORDER 7
 10 OVER 0: BORDER 1: PAPER 1: I
NK 7
 12 CLS
 15 DIM y(3): RESTORE
 17 FOR z=1 TO 3: READ p: LET y
(z)=p
 18 NEXT z
 19 DATA 6,5,5
 20 LET time=0
 30 LET speed=0
 35 LET bus=8
 50 LET b$="        ": LET r$="
 "
 60 LET a$=" "
 70 LET x=6: LET y=2
 80 CLS
 100 PLOT 0,149: DRAU 255,0: PLO
T 0,101: DRAU 255,0: PLOT 0,61:
DRAU 255,0: PLOT 0,21: DRAU 255,
0
 110 PRINT AT y,x;a$
 120 PRINT AT 18,5; BRIGHT 1;r$;
 INK 2; PAPER 6;b$; PAPER 1; INK
 7; BRIGHT 1;"
 290 LET z=0
 300 IF INKEY$="" THEN GO TO 300
 310 LET speed=.2
 320 IF INKEY$="p" THEN LET spee
d=speed+.1
 321 IF INKEY$="P" THEN LET spee
d=speed+.1
 330 IF INKEY$="q" THEN LET spee
d=speed-.1
 331 IF INKEY$="Q" THEN LET spee
d=speed-.1
 335 IF speed<.6 THEN LET speed=
.6
 337 IF speed>2.8 THEN LET speed
=2.8
 340 LET x=x+speed
 350 PRINT AT y,x-speed;"    ";A
T y,x;"
 357 IF x>29-speed THEN LET z=z+
1: PRINT AT y,x-3;"    ": LET y
=y+y(z): LET x=1
 360 BEEP .01,speed-10
 370 LET time=time+.5
 380 PRINT AT 0,0; BRIGHT 1;"Tim
e:";INT time;AT 0,14; BRIGHT 1;"
Buses:";bus
 390 IF ATTR (y,x+1+speed)=79 TH
EN GO TO 500
 391 IF ATTR (y,x+1+speed)=114 T
HEN GO TO 500
 490 GO TO 320
 500 PRINT AT y,x-2;"   "
 505 PRINT AT 18,5;"";  INK 2; P
APER 6;b$; PAPER 1; INK 7; BRIGH
T 1;"
 510 LET y=16
 520 FOR q=6 TO 6+speed*10: BEEP
 .05,1: PRINT AT y,x;" ": LET
x=x+1: NEXT q
 530 IF x<7+bus OR x>11+bus THEN
 GO TO 600

 540 PRINT AT y,x;"  "; LET y=16
 550 FOR q=x TO 29: PRINT AT y,x
;" ": BEEP .05,25: LET x=x+1:
NEXT q
 560 GO TO 800
 600 PRINT AT y,x;"  "
 610 LET y=y+1
 620 PRINT AT y,x;"  ";AT y+2,x;
FLASH 1;"8#)"
 630 BEEP .5,5: BEEP .5,2: BEEP
 .2,7: BEEP .6,5: BEEP .6,2
 670 GO TO 900
 800 IF bus=b1 THEN GO TO 8000
 805 LET bus=bus+1
 810 LET b$=b$+"B"
 850 GO TO 70
 900 POKE 23693,56: BORDER 7: CL
S
 910 PRINT AT 0,6; FLASH 1;"BAD
LUCK!!";AT 2,6;"YOU CRASHED!!!"
 915 LET bus=bus-1: IF bus=7 THE
N LET bus=0
 930 PRINT AT 7,5;"You jumped ";
bus;AT 9,5;"In a time of ";tim
e
 940 IF bus>high THEN LET high=b
us: LET htime=time
 945 IF bus=high AND time<htime
THEN LET high=bus: LET htime=tim
e
 950 PRINT AT 12,5; BRIGHT 1;"Hi
gh Score:";high;AT 14,5;"In a ti
me of ";htime
 990 INPUT "Another go? ";a$
 991 IF a$="y" THEN GO SUB 5000:
 GO TO 10
 992 STOP
 999 STOP
1000 POKE 23693,56: BORDER 7: CL
S
1001 PRINT AT 0,5; FLASH 1;"YOU'
VE DONE IT!!!"
1020 GO TO 930
5000 CLS : PRINT AT 0,5;"Stunt r
ide";AT 1,5;"
5010 PRINT AT 6,5;"P-To accelera
te";AT 8,5;"Q-To slow down"
5020 PRINT AT 21,0;"Up to how ma
ny buses ?"
5030 INPUT "(9 TO 17) ";b1
5035 IF b1<9 OR b1>17 THEN GO TO
 5030
5040 RETURN
8000 DATA 0,3,2,3,4,3,5,5,0,6,5,
3,4,3,5,3,7,5,2,6
8010 DATA 5,3,4,3,5,3,9,3.5,7,1.
5,7,4.5,3,5,3,4,3,2,4.4,4,5,5
8020 RESTORE 8000
8030 FOR x=1 TO 22: BORDER INT (
RND*7): PAPER INT (RND*7): CLS :
 READ b,a: BEEP a/10,b: NEXT x
8040 GO TO 1000
9000 DATA "a",0,0,0,63,31,119,86
,112
9010 DATA "b",240,16,32,224,192,
112,80,112
9020 DATA "c",1,3,7,15,31,63,127
,255
9030 DATA "d",127,65,65,127,127,
85,127,36
9040 DATA "e",128,192,224,240,24
8,252,254,255
9099 RESTORE 9000
9100 FOR s=1 TO 5: READ a$
9110 FOR x=0 TO 7: READ z: POKE
USR a$+x,z: NEXT x
9120 NEXT s
9999 RETURN
```

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Robin Bradbeer reports from the U.S. on the latest developments in the market

Timex upgrades Spectrum

TIMEX, the company which manufactures the ZX-81 and Spectrum in the U.K. and which has the right to market Sinclair projects in the U.S. and Canada, announced the launch of the U.S. version of the Spectrum at the recent Consumer Electronics Show in Las Vegas.

The TS2000, as it will be known, is an upgraded version of the Spectrum. Timex has taken the original Spectrum ROM and is in the process of re-writing it, taking out most of the bugs which have been identified by people like Ian Logan in the U.K.

At the same time, a number of Basic commands have been taken out of the ROM and, therefore, off the keyboard. For example, ATN, ACS and ASN have been removed, as have IN and OUT and the £ sign. A number of new functions will appear on those keys, including AUTO line number, RENUMber, line delete and a number of useful editing functions.

At the same time Timex plans to provide another port on the side of the Spectrum which will take ROM cartridges of between 4K and 32K. Those cartridges will contain games programs, business software and the like. It will allow software to be entered without needing a cassette player. Timex also announced a new printer for both the ZX-81, or TS1000 as its known in the States, and the Spectrum. The size of the printer, known as the TS2040, is slightly larger than the ZX printer. Instead of using electrically-coated paper, however, the TS2040 uses a thermal print mechanism. That is much quieter and far easier to read than the mechanism used on the ZX printer.

The prices of the 16K and 48K versions of TS2000 are $149.95 and $199.95 respectively. The ROM-based cartridges will sell for $29.95 each and the price of the TS2040 printer is $99.95.

Timex has also announced that it is reducing the price of the TS1000 which, unlike the ZX-81, has 2K of RAM as standard, to $84 for the next three months. That $15 reduction in the retail price brings down the TS1000 to approximately the same price as the ZX-81 in the U.K.

The pricing differential between the U.K. and the U.S. is much greater when the prices of the Spectrum and the TS2000 are compared. The 16K TS2000 at $149.95 is equivalent to £93.70 at the current rate of exchange and the 48K version is £124.96. As that is for an enhanced version of the Spectrum, it is possible to speculate that there may be a corresponding price reduction in the U.K. in the near future.

Timex has so far sold more than 600,000 TS1000s in the last nine months in the U.S. alone. The machine now accounts for something like 26 percent of the total number of home computers in the States. At the Consumer Electronics Show, Commodore showed, in a very flashy glass booth, its one-millionith Vic 20. The claim that it was the first computer to be produced in such quantities was disputed vigorously both by Clive Sinclair and Dan Ross, his opposite number at Timex. They claimed that more than one million ZX-81/TS100s had been sold by last November.

Sinclair Research had a separate stand at the exhibition and announced formally to the Americans the introduction of the Microdrive, Expansion Module and Prestel adaptor. All those peripherals were said to be available during Spring of 1983. The company also announced, for later introduction, a proportional spacing software program which will allow for a 64-character-per-line display. That heralds the addition of word processing capability.

'New printer is quieter and far faster than the ZX-printer'

A number of companies have set up in the U.S. selling British software. One is Mindware, a manufacturer of peripherals and software for the Timex-Sinclair computer system, and a U.S. distributor for an extensive library of business, engineering, programming and games software titles. The titles have been re-published, with new packaging and documentation appropriate for mass merchandising channels.

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Many software distributors were envious of the fact that British software could be sold in a simple plastic case with a paper or card insert. The Americans like things in bright, flashy and rather large packaging. That adds about 50 pence to the cost of the software and as it sells for the same price as in the U.K. it means less profit.

Mindware has announced an enhanced version of its MW-100 plain paper printer. The new model, the Sidewinder, is a dot matrix printer which can reproduce material up to 132 characters wide. It also prints in several other modes, including 16-character wraparound and a 32-character line-for-line printout of the Timex-Sinclair screen display. The full screen display is 32 characters wide by 22 lines deep.

The MW-100 was designed to use standard 1¾ in. adding machine paper tape and ribbon cartridges and is the only plain-paper dot-matrix printer made for the Timex/Sinclair. The MW-100 has a suggested retail price of $139.95.

Softsync is the biggest independent producer of software for the TS1000. When the ZX-81 began to be sold in the U.S., Softsync had tailor-made programs for the Timex line of software. By the time it was on the retailers' shelves it had an exciting line of software of its own.

Softsync announced new program releases at the show such as the master chess game, educational programs and new arcade-style computer games.

Another company, Orbyte, has produced a range of six new programs for the small business, including Execu-Diary and Execu-Address and a telephone file called Execu-Soft.

Finally, the Far East is beginning to make Sinclair lookalikes. The Futura 8300 being distributed in the U.S. by Unisonic looks like the Spectrum but is basically a ZX-81. It runs Sinclair software, takes Sinclair peripherals, and is the same price as the Sinclair.

With its rubberised keyboard, like the Spectrum, it could be the forerunner of a series of lookalikes. Sources inside Sinclair do not take the threat lightly and any unauthorised copies such as this will be "dealt with". Apple has been hunting vigorously the 30-odd Taiwanese companies producing Apple at one-third the U.S. price and we can expect Sinclair to start doing the same.

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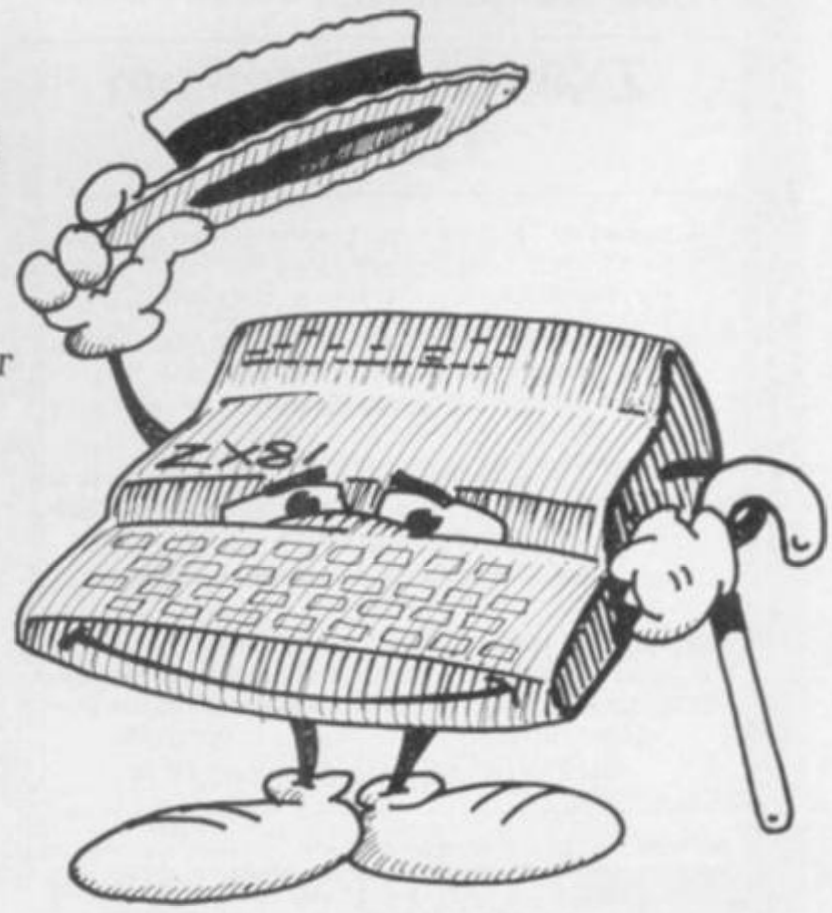

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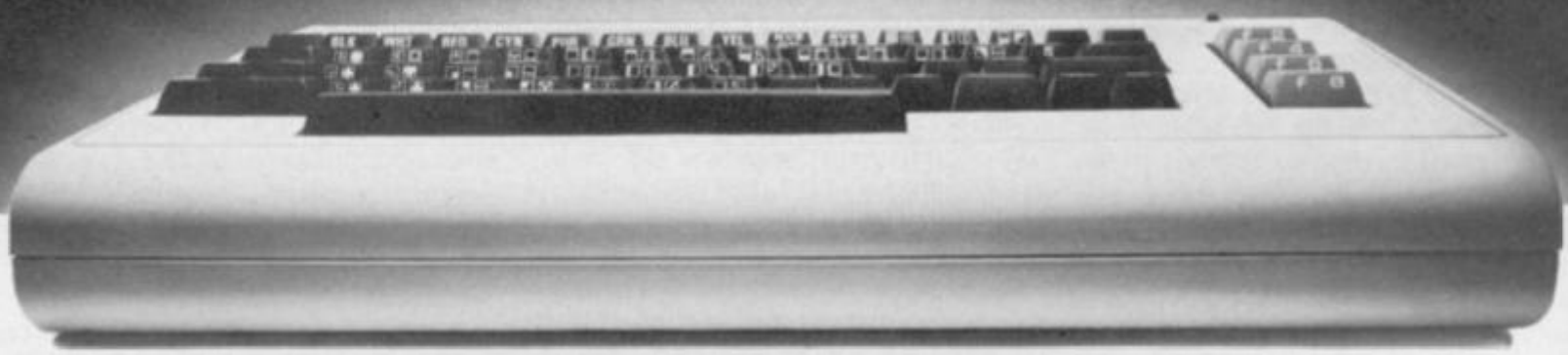

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Andrew Hewson considers a number of problems involving the use of graphics on both the ZX-81 and the Spectrum

Getting larger characters by using a Basic program

CAN ZX-81 characters be printed using POKEs to make them bigger and easier to read? That is what John Kerr of Rochester, Kent asks.

The answer is that there is a method, although it is not necessary to use POKE. The Basic program in table one PRINTs a character at eight times its normal size. The program is rather slow but it serves to illustrate the technique.

Both the ZX-81 and Spectrum construct characters by inking-in relevant squares in an 8×8 grid. No squares are inked-in for the space character, for example, and a star-shaped group of squares is inked-in to form the asterisk. An 8×8 grid is used because the form of each horizontal strip of squares can be stored using the eight bits which form a byte by inking-in a square if the corresponding bit is set to one. Thus eight bytes are used to store the form of each character. The ZX-81 character table is held in the ROM at locations 7680 onwards.

The program works by setting the variable A to the address of the first byte of the character selected by the user. Lines 150 to 270 are the beginning and end of a loop which cycles through each of the eight bytes in turn. The contents of the current byte are loaded into variable B and then compared to 2**7, 2**6, 2**5 and the like in turn.

That is equivalent to testing each of the eight bits. If B is greater than or equal to 2**I, the corresponding bit is set and so the program PRINTs a character. If B is less than 2**I, a space is PRINTed instead. Thus an image of the character is constructed which occupies not one but 8×8 PRINT locations.

The Basic program is rather slow to execute and so I have written the machine code routine listed in table two to do a similar task on the 16K ZX-81. The routine can be loaded using a simple hex loader, for example:

```
10 REM AT LEAST 46
   CHARACTERS
20 FOR I = 16517 to 16552
30 INPUT Z$
40 IF Z$ = "S" THEN STOP
50 PRINT Z$;" ";
60 POKE I,16* CODE Z$ +
   CODE Z$(2)-476
70 NEXT I
```

The REM statement must contain at least 46 characters because the machine code routine is 43 bytes long and it uses another three bytes to hold variables. To load the routine run the hex loader and enter each pair of hex character codes in turn.

To use the routine, retain line 10 of the hex loader and enter the following:

```
100 PRINT "ENTER A CHARACTER"
110 INPUT Z$
120 CLS
130 LET A = 7680 + 8* CODE Z$
140 PRINT Z$;" IS HELD AT
   ";A;"TO";A+7
150 FOR J = A TO A + 7
160 LET B = PEEK J
170 PRINT B,
180 FOR I = 7 TO 0 STEP -1
190 LET E=2**I
200 IF B-E THEN GOTO 240
210 PRINT Z$;
220 LET B=B-E
230 GOTO 250
240 PRINT CHR$ 0;
250 NEXT I
260 PRINT
270 NEXT J
```

Table 1. ZX-81 program to PRINT a character at eight times its normal size.

```
20 PRINT "ENTER A
   CHARACTER"
30 INPUT Z$
40 CLS
50 LET A = 8* CODE Z$
60 POKE 16514, A-
256*INT(A/256)
70 POKE 16515,
   INT(A/256)
80 POKE 16516, CODE Z$
90 RAND USR 16517
100 PAUSE 32768
110 CLS
120 GOTO 20
```

Paul Cooksley, of Dursley, Glos., has a Spectrum. He writes: **When I enter POKE 23607,50 the whole character set becomes spotty squares. Why?**

The chapter on the system variables of ZX Spectrum Basic Programming shows that location 23607 contains one fewer than the high byte of the address of the Spectrum character table. The character table is held at 15616 and so locations 23606 and 23607 normally contain 0 and 60 respectively because

0+256*(60+1)=15616

Thus, noting that the first true character in the Spectrum character set has CODE 32 not CODE 0 as on the ZX-81, the ZX-81 program in table one can be adapted to run on the Spectrum by substituting

130 LET A = PEEK 23606+256* PEEK 23607 +8* CODE Z$

It is also necessary to alter lines 190 and 240 as follows:

190 LET E = 2 ↑ I

240 PRINT CHR$ 32;

POKEing a new value into 23607 causes the Spectrum to look in a new place for the eight bytes which determine each character leading to the spotty squares effect which

Cooksley noticed. The same effect can be generated on the ZX-81 because the high byte of the address of the character table is held in the I register. A short machine code routine can be used to alter the value in I as in this program sent by Roger Milton of Bristol:

```
1  REM YO GOSUB? TAN
10 POKE 16517,71
20 INPUT A
30 POKE 16515,A
40 RAND USR 16514
50 IF A <> 30 GOTO 20
```

The GOSUB and TAN in line one must be entered as tokens. To achieve that enter the line in reverse order, i.e.

TAN b GOSUB?bb 1 REM YO

where "b" represents back-space. The program transfers the value entered by the user to the I register and the spotty squares effect results. If the correct value is entered (30) the program halts.

Unfortunately it is not possible to use values greater than 63 which would point into the RAM area because the ZX-81 hardware misinterprets the resulting address. The only effect is to generate black or white squares.

Hex code	Assembler Code	Comment
21 00 1E	LD HL, 7680	Address of table to HL
ED 4B 82 40	LD BC, (16514)	8*character code to BC
09	ADD HL, BC	
EB	EX HL,DE	
2A OC 40	LD HL, (D-FILE)	Address of display to HL
23	INC HL	
06 08	LD B,8	Set byte counter
C5	PUSH BC	and save it
06 08	LD B,8	Set bit counter
1A	LD A,(DE)	Byte to A
17	RLA	Left bit to carry
30 06	JRNC, +6	Bit set?
F5	PUSH AF	Yes, save A
3A 84 40	LD A,(16516)	Print character
77	LD (HL),A	
F1	POP AF	Restore A
23	INC HL	
10 F4	DJNZ,-12	Finished byte?
C1	POP BC	Yes
10 01	DJNZ + 1	Finished?
C9	RET	Yes
C5	PUSH BC	No
01 19 00	LD BC,25	Move print
09	ADD HL,BC	position to
13	INC DE	next line
18 E5	JR — 27	and take next byte

Table 2. ZX-81 routine to PRINT a character at eight times its normal size.

Unfortunately it is not possible to VERIFY tape copies of programs or data. **Is it possible to verify the screen display?** asks Michael Moses of Leeds.

VERIFYing the display should be straightforward using the commands

VERIFY " " SCREEN$

or as an equivalent

VERIFY " " CODE 16384,6192

Unfortunately the ROM routine which searches the cassette PRINTs the name of the cassette file to be VERIFYed on the screen, thereby corrupting the Spectrum copy of the display.

There are two solutions. The first is to copy the display to an area above RAMTOP and VERIFY the copy of the display. That technique has the added advantage that the display can be restored from above RAMTOP if required.

The routine in table three copies the display above RAMTOP, SAVEs and VERIFYs the copy and restores the display on completion. It is written to run on the 48K machine. To run it on the 16K Spectrum, change 229 in each of the DATA statements to 101 and change 58624 in lines 290 and 310 to 25856. Space must be reserved above RAMTOP before the display is generated by entering.

CLEAR 58624

on the 48K machine or

CLEAR 25856

on the 16K machine.

The routine works by loading two short machine code routines into the printer buffer from the DATA statements. The two routines copy and restore the display respectively by setting the HL register pair to the address to be copied from; the DE register pair to the address to be copied to; and the BC register pair to the number of bytes to be copied — in this case 6912. The LDIR instruction then moves each byte in turn.

The CLS command in line 9880 is redundant. Its only purpose is to

continued on page 90

```
9800 RESTORE
9810 DATA 33,0,64,17,0,229,1,0,27,237,
   176,201
9820 DATA 33,0,229,17,0,64,1,0,27,237,
   176,201
9830 FOR i = 23296 to 23319
9840 READ a
9850 POKE i,a
9860 NEXT i
9870 RANDOMIZE USR 23296
9880 CLS
9890 PRINT "Save copy on tape"
9900 SAVE "Display" CODE 58624,6912
9910 PRINT "Rewind tape for
   verification"
9920 VERIFY "Display" CODE 58624
9930 RAMDOMIZE USR 23308
```

Table 3. A routine to SAVE and VERIFY the display by copying it above RAMTOP.

continued from page 89

demonstrate that the routines are working correctly by clearing the display between copying and restoring it. The copy which has been SAVEd on tape can be LOADed in the usual way by entering

LOAD " " SCREEN$

The disadvantage of the routine is that a great deal of space — almost 7K — is used to store the display above RAMTOP, which leaves very little space on the 16K Spectrum for anything else. Table four presents an alternative which uses much less space because it stores only the parts of the display which are corrupted by the Spectrum cassette search routine. A special routine must also be used to LOAD the cassette copy.

The program works by copying the first 17 characters on line one of the display into the printer buffer — lines 9500 to 9560 — followed by the attributes of the 17 characters — lines 9570 to 9590. It then PRINTs on the display the message which the Spectrum cassette search routine will PRINT when it locates the cassette copy and SAVEs the display file, the attributes and the beginning of the printer buffer which can be used to restore the display to the correct condition. The routine then re-sets the PRINT position and VERIFYs the cassette copy — lines 9620 to 9630. Finally, lines 9640 to 9730 copy the contents of the printer buffer back to the display.

The VERIFY routine can also be used to LOAD the display by changing line 9630 to

9630 LOAD " " CODE 16384

It is important to note that the message PRINTed by line 9600 should be 17 characters long. Thus if the cassette copy is to be called "Display", three trailing blanks should be added after the word Display.

● *Please address problems and queries to Andrew Hewson, Helpline, Graham Close, Blewbury, Oxfordshire.*

```
9500 LET k = 0
9510 FOR i = 16416 TO 18208 STEP 256
9520 FOR j = 0 to 16
9530 POKE 23296+k, PEEK(i+j)
9540 LET k = k+1
9550 NEXT j
9560 NEXT i
9570 FOR i = 0 TO 16
9580 POKE 23296+i+k, PEEK (22560+i)
9590 NEXT i
9600 PRINT AT 1,0;"Bytes:Display"
9610 SAVE "Display" CODE 16384, 7065
9620 PRINT AT 0,0;
9630 VERIFY " " CODE 16384
9640 LET k = 0
9650 FOR i = 16414 TO 18208 STEP 256
9660 FOR j = 0 TO 16
9670 POKE i+j, PEEK (23296+k)
9680 LET k = k+1
9690 NEXT j
9700 NEXT i
9710 FOR i = 0 TO 16
9720 POKE 22560+i,PEEK (23296+i+k)
9730 NEXT i
```

Table 4. A routine to SAVE and VERIFY the display using the printer buffer.

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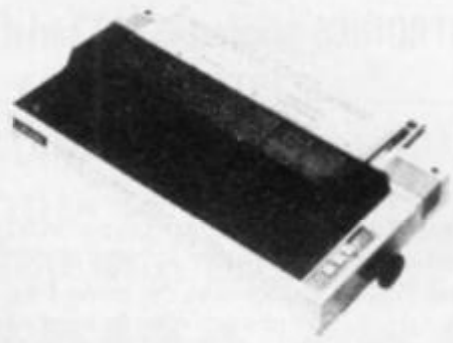

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SALES of **The Hobbit**, an adventure game for the 48K Spectrum, have been going very well, according to Melbourne House, the company which produces it.

It is one of the most complex games for the Sinclair machines I have seen and that is one of the reasons why it is selling so well. The plot follows closely that of Tolkien's book and there are added dangers to make it more interesting.

There are many objects in the game which cannot be used until certain situations have been passed or conditions met. They tend to take up a fair amount of time on this adventure. Much time can be wasted by checking objects which prove to be useless. For instance, many people who see the chest in the hobbit hole at the beginning of the game usually are tempted to look inside.

'It is one of the most complex Sinclair games I have seen'

The player may suspect that the chest contains weapons or armour but there is nothing inside. That may cause further consternation and a furious search. All that has happened to most victims of the game I know, including several people in the *Sinclair User* office. Usually a chest is for putting things into and at the beginning of the game there is nothing to store in the chest. The one thing to remember is that the most ordinary and unmysterious objects usually prove the most useful.

At all costs you must be practical, as examining objects which seem mysterious may lead you into the dark.

The Inglish language specially developed by the makers, which all the game's characters speak fluently, is causing problems for some people. Most of the time Gandalf and Thorin wander around saying 'Hurry up', 'What's this', or 'No' at the slightest provocation. You should not give up, though — experiment by talking to Thorin, Gandalf and Elrond. The information one of them will give you is certainly not misguided.

If you have managed to obtain more information from any of the characters, I would be interested to hear. In the early stages of the game it is best to follow one direction when going forward and that is explained in the Hints and Tips column. If in doubt, follow that direction and it will usually get you out of trouble.

There are some very odd moves which you can make during the course of the game. For instance, if you have a sword you could kill Elrond when you visit Rivendell. That is very easy to do but your blood lust could prevent you learning Elrond's secret. That may not seem very important at the time but it could make a difference to the outcome.

A sword is a basic piece of for any adventurer and can be of use against most foes, as well as Elrond. Your sword is provided for you in the early part of the adventure and it is a good idea to pass the trolls to get it. The secret of the sword is difficult to unlock but you must remember that problems are not half so bad in the daylight.

There are two other problems which adventurers in The Hobbit are meeting. The first is the maze in the misty mountains. If anyone has managed to get out alive I would like to know. The second problem is that the program sometimes crashes when you have battled your way through the Elven King's Halls, got into one of the barrels in the cellar and plunged into the underground river.

One correspondent has had that happen several times. The makers of the game believe that it is the fault of the particular tape copies.

Hints and tips — read only if desperate.

Go east when all else fails or north when past the mystic Elves.

A stone troll is the key to the door when day dawns.

Beware of pitfalls in Beorn's house.

Turn west at the wooded gate to the north.

When pale eyes are about to sting, retrace your steps.

• *Philip Joy, author for 10 months, will no longer be writing this column and I have been asked to take over. It is intended to expand the areas covered. If you have views about mind games, including chess, adventure and computer-moderated games, I would like to hear from you. Also, if you have any hints or problems you would like to offer, send them to Mind Games,* Sinclair User, *30-31 Islington Green, London N1 8BJ.*

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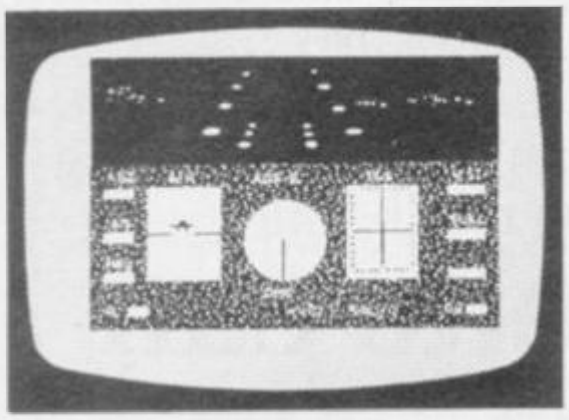

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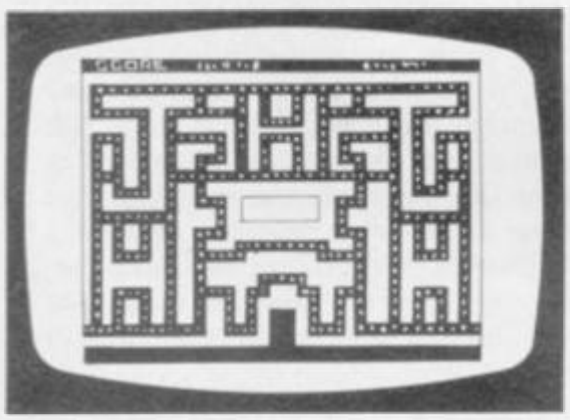

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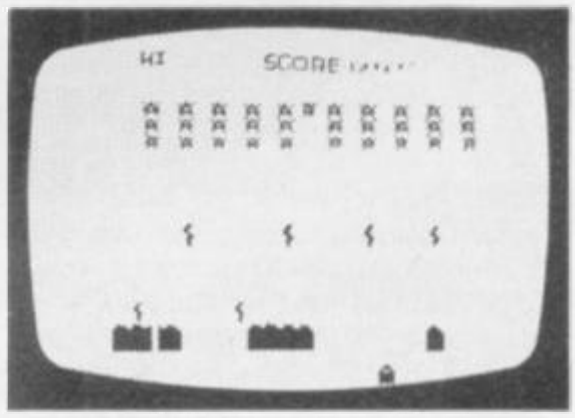

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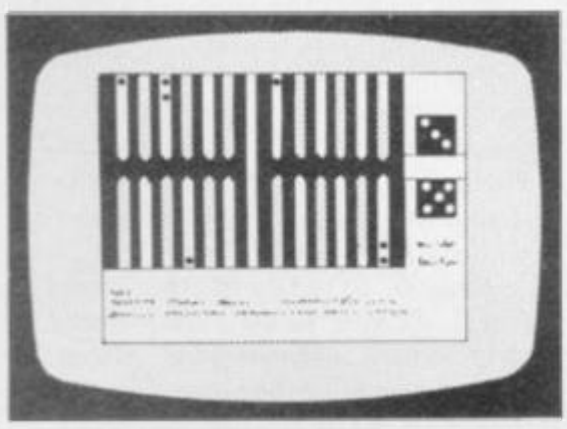

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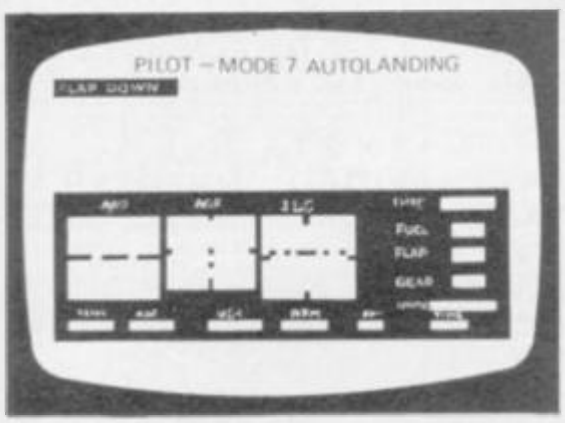

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Sinclair User, October '82

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2 extracts from *ZX Computing*, Oct/Nov '82

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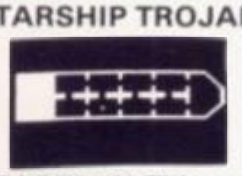

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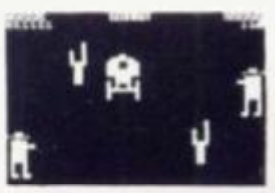
SECRET MESSAGES This message coding program is very txlp qexi jf.
MARTIAN CRICKET A simple but addictive game (totally unlike Earth cricket) in machine code. The speed is variable, and its top speed is very fast.
Cassette Three costs £5.

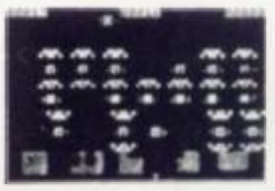
CASSETTE 4 **8 games for 16k ZX81**

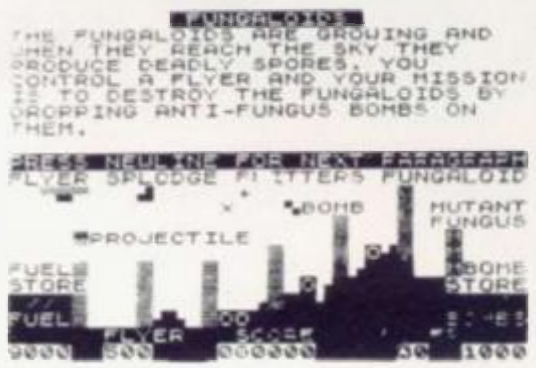
ZX-SCRAMBLE (machine code) with 3 stages.
Bomb and shoot your way through the fortified caves.

GUNFIGHT
(machine code)



INVADERS
(machine code)





GALAXY INVADERS (machine code)
Fleets of swooping and diving alien craft to fight off.
SNAKEBITE (machine code)
Eat the snake before it eats you. Variable speed. (very fast at top speed).
LIFE (machine code)
A ZX81 version of the well known game.
3D TIC-TAC-TOE (Basic)
Played on a 4 × 4 × 4 board, this is a game for the brain. it is very hard to beat the computer at it.

7 of the 8 games are in machine code, because this is much faster than Basic. (Some of these games were previously available from J. Steadman). Cassette 4 costs £5.

Please make cheques payable to ORWIN SOFTWARE. Recorded on high quality cassettes, sent by first class post from: ORWIN SOFTWARE, Dept. OSU, 26 Brownlow Road, Willesden, London NW10 9QL.

BUG-BYTE SOFTWARE, MORE THAN A GAME ...IT'S A DOOR TO ANOTHER DIMENSION !

All about me was darkness. Tens of thousands of screens stared blankly into space. Minds drifted aimlessly, dulled by lack of stimulation. The world was grey, drab, lacking . . .

Then suddenly it happened. First one, then another, then tens, hundreds, thousands of tired screens felt a surge of power and flickered back into life. They were much as I had seen on my own planet's microcomputers – the ZX 81, ZX Spectrum, Vic 20, BBC Micro and ORIC-1.

The minds paused to take stock. They clustered round the screens, their nimble fingers excitedly flicking the controls back and forth. At last they had found a challenge . . . action and adventure with cunning tests of dexterity and reaction. Everywhere, conversation was of Asteroids, Mazogs, Panic, Another Vic in the Wall.

Unable to resist, I too had a closer look. There before me was vivid colour, high resolution graphics. I could practically feel the spine-tingling sound effects as whole battle fleets of Cosmiads swarmed out of nowhere and attacked. I should have known. As my fingers raced over the controls, and I prepared to stand and fight with only a single laser bolt for protection, I realised I was trapped!

Too late now, I remembered this was no ordinary software. I'd been warned, as I now warn anyone buying from Laskys, W.H. Smith, Currys Micro C, Spectrum and larger branches of Boots, and a nationwide network of dealers stocking Bug-Byte. Because Bug-Byte is more than a game, it's a door to another dimension. One that I had opened.

BUG·BYTE
SOFTWARE

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